

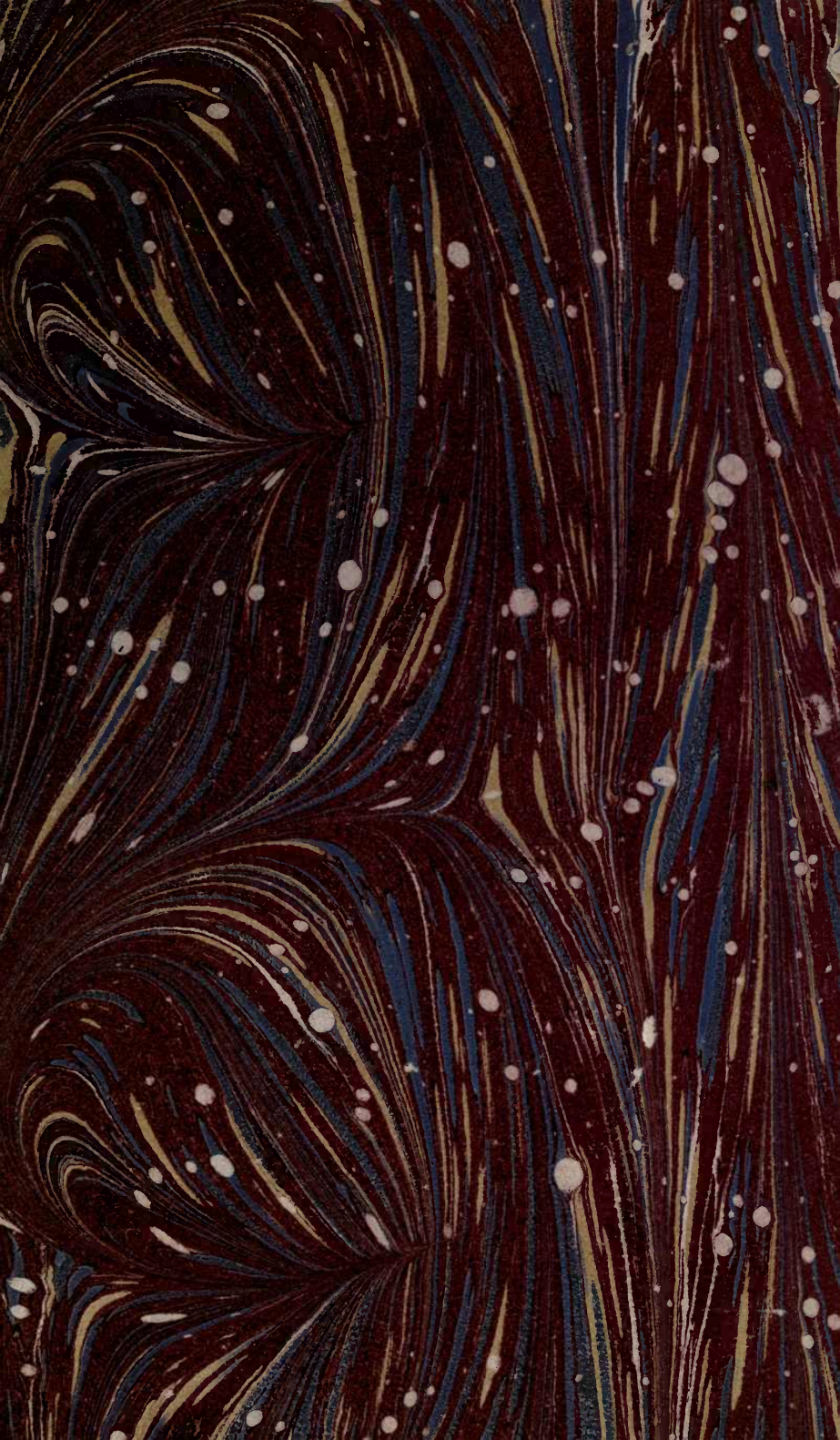
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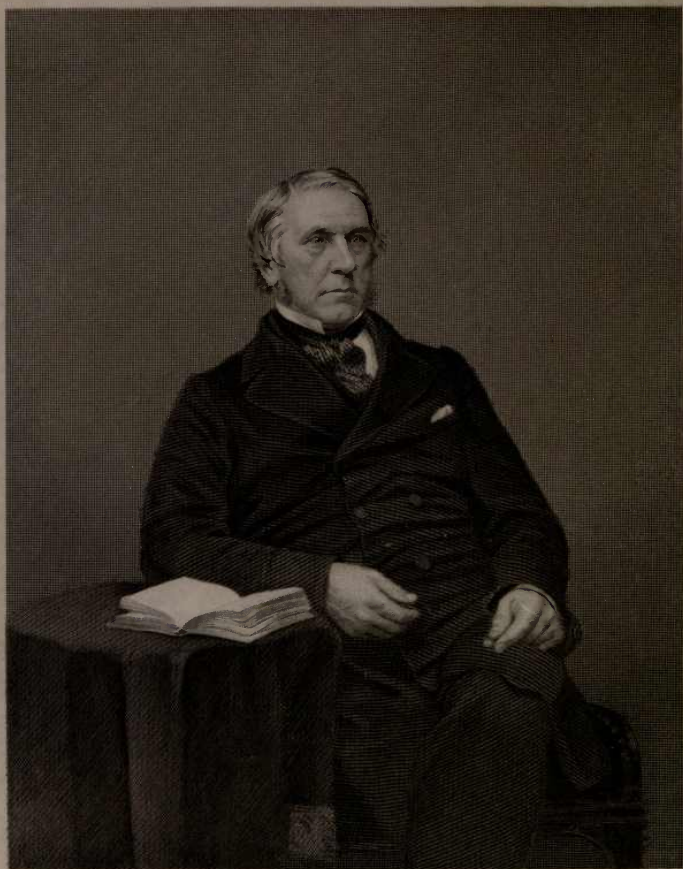


James T. Bailey

from his friend

James T. Bailey

London 1845



JOSEPH LOCKE.

ENGRAVED BY JOSEPH BROWN, FROM A PHOTOGRAPH BY J. E. MAYALL.

THE LIFE
OF
JOSEPH LOCKE,

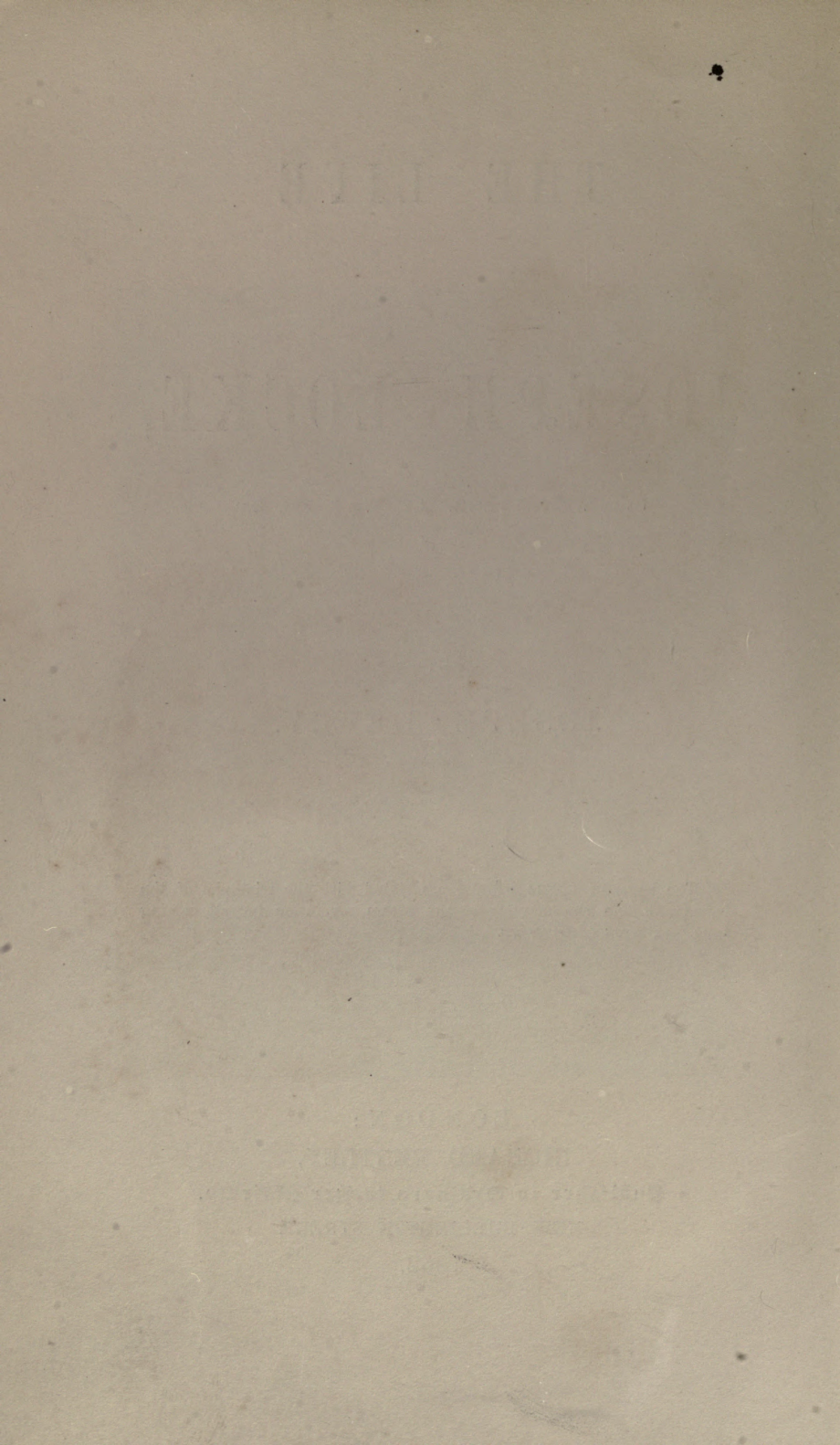
CIVIL ENGINEER, M.P. F.R.S. Etc. Etc.

BY
JOSEPH DEVEY.

"The name of LOCKE will be associated with the triumphs of the locomotive and the marvels of the Steam revolution for all coming time."—*Provost of Greenock.*

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THE LIFE OF JOSEPH LOCKE.

CHAPTER I.

FAMILY MATTERS.

THE pride of ancestry is cherished as a pious sentiment by those who can legitimately boast its possession: by those who find themselves without this intangible heirloom, it is regarded as at worst a very pardonable conceit. But all agree in treating as the fit subjects for ridicule those who falsely affect to have what they are just as well without. Still, every man has a pedigree,—a pedigree which can be traced to a more or less remote period, if the investigation be considered worth the labour. Where it exemplifies the law of hereditary transmission, and so throws light on the character of him who suggests the search, it is of value. When it but parades the greatness of predecessors as a cloak for the smallness of their latest representative, it is not only valueless, but unwise.

In recounting the career of Joseph Locke, the above distinction requires that the career of his immediate parent, at least, should meet with a notice which the hardworking, unconscious coal-surveyor never, we may be sure, anticipated for it. Joseph

Locke was, indeed, William Locke's son. Of the father of the latter we know no more than that, whilst himself manager of a coal-mine at White-lane, in the neighbourhood of Sheffield, he was sufficiently esteemed and possessed sufficient interest to be able to procure for one of his sons, John Locke, the appointment of manager of a colliery at Kippax, a village situated some six or seven miles from Leeds. In this colliery John Locke ultimately became a partner. That his reputation and influence remained unimpaired, we are enabled to gather from the fact that a few years later he obtained for his other son, William, the father of Joseph Locke, a similar situation at Attercliffe, in the neighbourhood of Sheffield.

William Locke was born in the parish of Lanchester, in the county of Durham. At the time that he was sent for by his father to take charge of the colliery at Attercliffe, 1802, he was working at the Water-row pit in the village of Newburn, made for ever famous by having once had for its engine-brakesman no less a man than George Stephenson. At this pit William Locke acted in the capacity of banksman, not brakesman, as is inadvertently stated in Mr. Smiles's popular *Life* of that illustrious engineer. His duties as banksman were to await the arrival of the coal at the pit-mouth, enter it, and apportion the wages of the various workers in the mine according to the amount of coal sent by them to the surface. For this nothing was required but an

intimate acquaintance with the three rudiments of education, and a reputation for impartial and judicial integrity, the former not being so common a possession in those days as we will trust that the latter is still in these. He brought with him from the Waterrow pit to Attercliffe the highest testimonials. The proprietors of the mine, finding that his services were in no degree overrated by his recent employer, promised that, in case a change of partners took place, he should have a share in the profits of the undertaking. A change did take place. The fulfilment of the promise was urged, but excused, and finally denied. It would seem as though he were in this almost anticipating his son's career. But he acted with more resolution and in a more uncompromising spirit than his son was inclined to act when placed in a like situation. Himself a man strict of word, he was utterly intolerant of those who were not; and annoyed more with the infidelity of his employer even than with the detriment to his prospects, he quitted his service and went to Huddersfield.

Here he undertook the management of some mines of which Sir John Ramsden was proprietor, and which he himself worked. For three years all went well. But at the end of that period the men turned out, as the phrase goes, for higher wages. Strikes were then in their infancy. Is it to be wondered at, that the means devised for meeting them should have been equally immatured? Adam Smith

had, it is true, devoted a chapter to their consideration; but he had summed up too hastily, and utterly condemns them. No Mill had as yet appeared to temper the severity of the scientific deductions by considerations which, without violating fixed laws, take some cognizance of shifting wants; and even now that he has appeared, and educated a race of younger men who strive to spread the doctrines of their master, the employed still seem to recognize no cure for their state but demands urged in the rude shape of a refusal to work, the employers no security to their capital and authority but an answer in the shape of a refusal to listen, and social polity no duty but a stupid indifference to the entire conflict. Matters could scarcely be much worse in 1807 than they are now. They certainly were no better. For, when Sir John Ramsden's colliers struck for higher wages, he quietly resisted them. His manager was not a man to be quiet, if quiet could be avoided. To him a friendly feeling was intelligible; a feeling of hostility, when he could persuade himself that right was on his side, little less congenial; but a truce was ridiculous. Some of the colliers gave him an opportunity of action, and he seized it. They transgressed the law. William Locke prosecuted, and got one of them sent to Wakefield. At last the strike came to a close, but not the feeling engendered by this unhappy prosecution. The men declared that, though the strike should cease, they would never work at the pit so long as William Locke remained

agent. They stuck so firmly to their word, and so displayed the measure of their resolve, that Sir John Ramsden was forced to yield. Yet, so exasperated was he by their behaviour, and the compulsory loss of a faithful and valued servant, that he shortly afterwards gave up the workings and let the pit.

To those who were personally acquainted with Joseph Locke it will at once be evident, and to those who may come to be acquainted with his character through this Life, it will we trust be made so, how thoroughly the father conducted himself, as the son would have conducted himself if placed in an analogous situation. The sense of personal duty was all-powerful in each. Humanity was all very well. Toleration or pity and forgiveness and long-suffering were all very well. But the fealty of personal service, promised, must be performed. These men declared themselves Sir John Ramsden's antagonists. William Locke was Sir John Ramsden's agent. And Sir John Ramsden's agent would resist Sir John Ramsden's antagonists to the last. It was his duty, and he would do it. It was a disagreeable duty, but he would do it. So he acted towards his individual employer, and against his employer's declared antagonists, just as Joseph Locke over and over again acted towards his aggregate employer the Public against the Public's opponent, vacillating chairmen, incapable Boards, and scamping contractors. Both might suffer the same fate: both would pursue the same unflinching policy. Colliers might refuse

to work under the father, and so the father might lose his post. Directors might refuse to preside at a table where the son would be able to denounce them, and so more compliant engineers might be preferred. But the father, for all that, would put the one upon their trial, and the son, for all that, do his best to put the other to shame.

The straightforward north-countryman began to suspect that honesty and loyal dealing were commodities that became rarer as folks travelled south. He was surrounded by a family of seven children, five of whom were still young enough to be dependent on his labours. He feared he had done sadly wrong in leaving the neighbourhood where he had been brought into life, and where he had learned the means by which life is made both profitable and pleasant. He would go back north and try his fortune in the coal-districts of Durham. He heard, at distant intervals, of his old friend and fellow-workman, George Stephenson, who, though not yet before the general public, was already a local celebrity by reason of his strange contrivances and obstinate ingenuity. He imagined, no doubt, that a fairer field for manly intelligence, such as he understood it, lay open in the land which he had quitted. He would turn his back on those ungrateful, churlish Yorkshiremen, and carry his family and energies where the one would be appreciated and the other decently supported.

On the eve of his departure, the agent of a colliery at Barnsley was accidentally killed by the ma-

chinery at a calender. One of the partners in this colliery, a Mr. Clayton, was a partner in the Kippax Colliery, in which, as has been already told, his brother John had by this time obtained a share. The post, vacant by the death of the unfortunate agent, was offered by Mr. Clayton to William Locke. Not without grave doubts, we may be sure, as to whether he ought longer to have his abode among these Egyptians, these hard, ungracious taskmasters, not without serious misgivings and strong yearnings for a sight of the coal-fields beyond the Dee, was the offer accepted. But it was accepted, and he was forthwith installed in the management.

It was the very post for him. He found everything wrong. The workings were in the most lamentable condition. The ledgers showed most miserable returns. Poor returns at the top of the pit had induced false parsimony at the bottom; and the unsatisfactory state of each was going on continually aggravating the unsatisfactory state of the other. By his vigilance and economy, William Locke soon managed to mend the receipts sufficiently to enable him to descend and mend the workings. Improvement in them communicated fresh improvement in the weekly returns. And it was not long before the books, which had previously shown a balance of one or two hundred pounds, and sometimes a deficiency of even more, showed a healthy surplus of twelve hundred a year. About this period his father died. He had held the appointment of

coal-viewer to the Duke of Norfolk. This appointment William Locke inherited, and held for the remainder of his life.

It came just in time, for more troubles were ahead. He had made bricks out of straw, and now these rascally Egyptians were going to turn round and complain of their quality. The resident partner, either in a fit of spleen or from less excusable motive, cast some imputation upon the agent's management. William Locke no sooner caught the sound of the imputation than he made his resolve. But before carrying it into effect, or even announcing its nature, he insisted that the absent partner should come over to Barnsley and inspect both books and pit. The inspection proved but too clearly that he had made whatever was profitable in the second and whatever was agreeable in the first. The resident partner was silenced; but their manager was not. Then it was that he spoke out his resolve, which simply was, that the sooner they found another agent the better, for he would never more be officer of theirs. No more than Cæsar's wife, must his entire capacity even be suspected. He took high ground. But with the sense of insult was mingled also the sense of their thanklessness. Instead of deeming him incapable who had made the concern, they ought long ago to have offered him a share. Were they to offer it to him now, he would not accept it. When he had finally left Barnsley, and was living at Sandal Magna, he had the satisfaction of being periodically consulted

by the very partner who had caused him such deep offence.

It is probable that the man, who was right-hearted enough, employed this as the most delicate means of healing a wound and repairing an injury which he had only by inadvertence inflicted. An ordinary, and perhaps what most people would call a sensible man, would have suffered no wound by, and made no injury of the occurrence. But consciousness of power, joined to loyalty of purpose, is invariably sensitive. A man may be capable, but unscrupulous; a man may be scrupulous, but incapable. The former has no care, the latter no right, to resent the challenge of powers that are avowedly open to question. But the man who knows that he both can and will do the very best for everybody about him, is sure to take uncommon quick care that nobody about him shall impugn his capacity or willingness twice. It is very well for Napoleon to write to his brother Joseph:—*“Avec de petites vanités et de vaines considérations, on n’a jamais fait rien de grand,”* since with him no means, however sordid, could be too small, provided the end were what he thought sufficiently great. A brigand in purple may prefer his crown to his conscience, and consider loud “applause and aves vehement” everything, and moral sense nothing. But the world has long suspected, and is rapidly coming to avow, that real grandeur is made up not of stage heroism, but of unobtrusive sacrifices; and that the man who has not been extolled

during life is the man most likely to be worth holding up as an example after death. In such an age William Locke has haply the chance of being considered a hero.

He stood in need to be at least of that sterner stuff of which Shakspeare assures us that ambition should be made. Despite the large family which he had to rear, and the smallness of the means (never certainly exceeding, if ever reaching, £300 a year), he and his frugal, ever co-operating wife had contrived to put by a purse; and with its contents he was determined to have and work coal of his own. He opened a pit in Cockram Lane, in Barnsley. No sooner was the work fairly started than arose a dispute about a watercourse with which the colliery was alleged to interfere. His opponent was an attorney; so York was the natural ground on which the difference could be settled. William Locke was beaten; he was a poor man. The man who opposed him was a lawyer, Locke thought an unscrupulous one. Whether from disgust or want of means, or both combined, he resolved to have no more law, so parted with the coal. It has since been all worked, and the pit closed.

But, however much it is necessary just at present to insist upon the natural march of human affairs, Providence does eventually interfere in behalf of him who trusts long and is not cast down. Even the gods are compelled at last to look with some little complacency on the losing side. And if it be,

as it undoubtedly is, true that Heaven helps those who help themselves, it was certainly high time for Heaven to help William Locke. He had succeeded in getting the whole of his family settled, Joseph, the youngest son, having just been placed, as will hereafter be described, under George Stephenson at Newcastle. He was rapidly approaching that age pronounced by Scriptural authority to be the limit of human life. It was his destiny considerably to exceed it. Is it not consoling to know that it was exceeded under the condition of uninterrupted peace?

In 1832, Mr. Stobart, whose name will re-appear in this history, left vacant by his death the post of coal-viewer to Lord Stourton. It was bestowed upon William Locke. He removed first to Sandal Magna, thence to Rothwell Haigh, a large house surrounded by an extensive garden, the property of Lord Stourton, situated nearly half-way between Leeds and Wakefield. Here his compulsory labours were light, and such as became his years. Two or three times a year he had to descend Lord Stourton's pits and measure the amount of coal that had been won. But his spontaneous toil was never relaxed to the last. The grounds attached to the house, both kitchen-garden and pleasure-garden, were kept in order exclusively by himself. Rising frequently at five, and never later than six, he worked in it for a couple of hours before breakfast. He returned immediately after, and, save his frugal dinner at half-past twelve, allowed

nothing but the visits of friends, and not always these, to suspend the operation of his steady energy till dusk.

In summer he might have been seen with spade, rake, or hoe in hand till nine o'clock in the evening, and even later; his wife, as venerable in age and appearance as himself, frequently reproving him in north-country accent with the never-varying formula, "Ma dear, you have noo moderation." But moderation would have necessitated either some falling off in the absolute perfection to which he had brought his garden, or the admission of some one else's assistance, and William Locke was as little likely to tolerate the one as the other. Nobody besides himself should have such a garden; and nobody besides himself should have anything to do with making it incomparable. He was as jealous of the superiority of his potatoes, his red currants, or his roses, as was ever beauty of the pre-eminence of her charms, or poet of the supremacy of his verse. And when on one occasion a son-in-law, who lived some little distance away, conscious of the old man's foible, had playfully boasted that he could show him gooseberries almost twice as large as any that Rothwell Haigh could produce, he was indignantly incredulous, and proved the honesty of his incredulity by going over, a few days after, to judge for himself. At first "he did nae think so: any way, it was doobtful; though he wad nae deny that the gooseberries were fine." And when, to carry the joke

to its extent, his son-in-law produced from his coat-pocket the very gooseberries which had been given to him at Rothwell Haigh as specimens of its productive powers, and they proved to be little more than half the size of those now examined, and he was obliged to confess, with anything but a good grace that "might-be it was nae so doobtful," he consoled himself by tasting the latter and remarking that, in growing to a size that was "oot of all character," the berries had altogether lost their flavour. And though the best was forthwith done to mollify him by taking him to the flower-garden and confessing against all evidence that it could show no such roses as Rothwell, he was not quite himself for the rest of that day, but rather avoided for many another a place where he was a most frequent, welcome, and delightful guest. Whenever he did come in future, everybody knew that gooseberries were a forbidden topic.

The extreme affection for his garden had one result which is perhaps incident to all affection. His garden, in consequence, gave him far more trouble than if he had loved it with discretion. Such was his fond tenderness that he either could not see or would not chastise its faults. In it was a good deal of timber that ought undoubtedly to have come down. But not a tree—no, not a branch should be touched. You might just as well have asked him to lop off one of the Ten Commandments. It was very old, and deplorably in the way of younger growth; but it should hold its ground for all that. It had

been there for many a year. It was there still. It was, like himself, very venerable, and like himself, dear old man, perhaps a little obstructive. But he was not going to remove it, and he would take good care that no other should remove it. He has gone now, and it has followed.

For the birds he had an equal affection. The stupid destruction of them, such as wise no less than humane men have at present to deprecate, would have filled him with immeasurable anger. He thought with Pope that not man's alone

. " the harvest of the plain :
The birds of heaven shall vindicate their grain."

Doubtless he was observant enough to know their use. But it was a more familiar feeling than the consciousness of their services which rendered them the objects of his gentle regard. They were his kind companions. They were pecking at his feet as he turned up the soil with his spade ; they were singing over his head as he trained the feelers of his plants. It used to please him to have, as much as it used to please his young grandchildren to see, the robins feeding from his wrinkled hand. And probably he was never so happy as when he had some of these little ones to talk to, collecting all the while the dead leaves from his flower-beds, or earthing up his matchless celery. One of his grandsons well remembers how on one of these many occasions, when he went to pay his first visit at the beginning of the

half-yearly holidays, the grandfather was curious to know what were the subjects of his study. The boy answered with the usual roll of Latin, Greek, French, algebra, history, &c. When he had got to the end of his catalogue, William Locke asked if he was not taught land-surveying. When answered in the negative, he plunged his spade deeper than usual into the soil, rested his foot upon it and looked blank astonishment. Not teach land-surveying! It must be a very queer sort of school where they did not teach land-surveying. It seemed to him more "monstrous" even than Falstaff's bill at the Tabard seemed to Prince Hal: since here was equally "such a quantity of sack," and positively no bread at all!

The simplicity of his occupations and the frugality of his diet made him intolerant of pastimes less simple and fare more sumptuous. He used often to say of one of his daughters whose married life was as moderate in its pleasures as it was complete in its happiness, that he "really wondered where she intended to go to." And, though probably no rich man's table in England was at the same time so thoroughly hospitable and so little prodigal as his son Joseph's, he could not refrain from expressing to his son's wife, that he thought her dinners "positively sinful." Anxious as that son was that his father should enjoy all the comforts which his own fortune enabled him to confer, he never succeeded in carrying out his intention. William Locke had

worked hard and lived simply all his life, and he could work hard and live simply still, without the assistance even of a son whom he loved and admired. He liked work for work's sake ; that work, together with money which he had withal contrived to save, bringing, in his advanced years, every comfort for him and for his devoted wife, who spent the few years during which she survived, in regretting and longing to rejoin him. His death was a quiet going out : not a conflict, not an agony.

For his life had been thoroughly consistent throughout. *Qualis ab incepto* might appropriately have been his motto. He had no occasion to exclaim that at least he would die with harness on his back. The winds had blown hard enough all along, and he had never been out of harness for a day. There was no need in his case for a melo-dramatic termination to blot out the remembrances of an unworthy career. At one period of his life he was sixteen miles distant from a place of worship. Ever as strict in practice as unwavering in belief, he took no count of those sixteen miles except to mount his wife behind him pillion-wise, and traverse them every seventh day as surely as every seventh day came round. When there was no chapel at Barnsley whose ritual satisfied his conscientious wants, he set to work, poor man as he was, to get a mission founded ; and he founded it. Whilst the chapel was being built, he gathered in his own house every Sunday those who were of his way of thinking, him-

self read prayers and a sermon, and instructed their children in the catechism. Probably he was never employed so perfectly after his own heart. But the fact displays, more perhaps than any other, the unflagging energy and unswerving determination of the man. It need not be concealed that he took a pride in what he did; but he prided himself upon doing his duty. Not to be proud to that extent is simply to be indifferent. On one occasion, when some pits at Noblethorpe, near Barnsley, filled with fire-damp, and no one connected with them would descend the shaft, he was applied to. He went down to inspect the workings. It was evidently some one's duty to go; and when everybody who was more called upon than he, had refused, it became to him evident that it was his duty to go. He encountered the common fate of heroism; a fate which always has in it to the superficial a tinge of the ludicrous, to the more profound a touch of pathos. He was sent on a mule, which threw him. His wrist was sprained by the tumble. A surgeon's bill was the consequence. The bill had to be paid by himself.

His opinions were, of course, extreme, but ever "leaned to virtue's side." Nor had his habitual catechising of the children the effect of leaving him less dogmatical. He maintained, against all the authority and reasoning of the clergyman, when he had succeeded in obtaining the appointment of one, that if a man were dying of hunger in a turnip-field not his own, he was bound to lie down and starve

rather than touch a single turnip ! And so shocked was he by the contrary position, that he for some time harboured grave doubts as to whether this clerical new-comer were all that he ought to be.

In the possession of him who writes this page is a copy of the "Essay on Man," printed within a few years of Pope's death. The back is very brown and worn ; the leaves are very yellow, and very much thumbed. It once belonged to William Locke. He said that it was the best of English poems, and that the best line in it was :

" An honest man's the noblest work of God."

The assertion was in him no affectation of sentiment. It was the expression of his creed, the reflection of his conduct. He did not admire what he did not strive to be. Most will allow that he strove successfully. In such a struggle failure is impossible. Of other failures he had had enough. His life consisted of them. But what are failures such as these ? There is no real ultimate failure save despair. All failures besides but teach a man his own secret. When he has quite learned that, he can fail no more. The public life of Joseph Locke will, we trust, be fertile in instruction ; but it cannot be more encouraging to the faint-hearted than this private life of his father. Truth to say, one was the logical continuation of the other. To it we will now turn our attention.

CHAPTER II.

YOUTHFUL DAYS.

JOSEPH LOCKE, the youngest of the four sons and the sixth born of the seven children of the brave good man whose story we have just rapidly narrated, was born at Attercliffe, near Sheffield, on the 9th day of August, 1805.

The house in which he first drew breath is situated in what was then virtually, and is even now still designated Attercliffe Common. The house, and a windmill but some quarter of a mile away, were the only landmarks of the quiet suburb. When, six months or so back, we visited it, we seemed, even on arrival, scarcely to have escaped beyond the steel-dust and irksome clamour of an offensive town. The snow was still white on the Derbyshire hills. In the Sheffield ways it was deep dirty sludge. And the first home of Joseph Locke, then untenanted, looked little like as though it had ever been the abode of neat thrifty industry, or the birthplace of aspiring and successful talent. Yet a slight acquaintance with its past and the ways of those who once inhabited it, eked out by a little imagination, enabled us to see that, sixty years ago, it must have been a

pleasant spot enough for those to whom porticos and palatial gardens are not a condition of existence. Below were but two sitting-rooms, above but three bed-rooms ; without, was rather less than an acre of inclosed ground. But the “ grand old gardener and his wife ” between them, we may be sure, made the best of both. Around them was a common, circumscribed by fat fields, broken by lean strips of wandering lanes ; and only in the distance was the inappreciable moan of the surly streets.

As our relations with great men are no longer mythological but positive, we are unable to relate that any portents attended Joseph Locke’s birth or played about his cradle. And just as in later life, though he constructed works vaster far and far more important than the walls of Thebes, we shall not be able to boast that he constructed them by the simple but somewhat supernatural process of breathing through a reed, so we cannot honestly assert that he was the offspring of a sunbeam or the foster-boy of a wolf. And though carrying a railway over Shap Fell was, perhaps, as serious an undertaking as digging the trenches of Rome, Attercliffe Common for all that was not so marvellous a place as the mountains of Apulia. But desisting from all competition with such more fortunate biographers, we shall not find much to detain us long on the threshold of his existence. If it be true, as seems to be generally accepted, that no one is a hero to his own valet, in quite as small a degree is a boy a hero to his brothers

and sisters. And though those of Joseph Locke who have survived him would be anxious enough now to recall every prank he ever played, every scrape into which he ever got, any anecdote he ever told, they can do but little more than unanimously assert that he was always playing pranks, always getting into trouble, and had always a good story to tell. He was clearly at least his sisters' favourite. If he teased them more, and played upon them a greater number of practical jokes, he was more entertaining and more, as the phrase is, full of fun. He was indeed the "life of the house." It was not indeed to be expected that this vivacity would always be regarded by parents with an indulgence similar to that with which it was regarded by his playmates. Joseph had often a good thing to say, and said it, when his father thought and told him he had much better hold his tongue. His stories were frequently regarded by such a severe disciplinarian as mere childish impertinence. He was often reprimanded for this excess of spirit, and on more than one occasion had to submit to being sent out of the room, with the stern remark that he was really "too forward and positive for anything." William Locke might have remembered, without any acquaintance with Horace, that eagles do not usually hatch stock-doves.

He was but five years of age when, as we have already narrated, his father removed to Barnsley. This flourishing market-town, in the honour of Pontefract, is situated on a hill which rises boldly from

the banks of the river Dearne. Around is a framework of various scenery,—hill and dale, pasture-lands and remnants of ancient woods, through which the Dearne works its unchangeable way. The sombre aspect of the moors, and the sooty interference of the clamorous little town, make a dark but not a disagreeable contrast with what would otherwise be, perhaps, too bright a picture.

The importance of Barnsley dates only from yesterday. In times not so very remote, it was no more than a knight's fee. As such, the manor fell into the hands of the monks, and quietly remained in their possession for four centuries. When monastic authority was destroyed, it reverted to the Crown. William of Orange bestowed it, as a sort of make-weight in a more substantial grant, upon his favourite Bentinck. Bentinck's grandson, the second Duke of Portland, sold it to Osborne, the fourth Duke of Leeds. It remained still, however, of little importance. Deep under ground lay the germ of its consequence. Deep under ignorance or indifference lay the full motive power of steam, which was to agitate and so evolve it. When William Locke settled in the town in A.D. 1810, it did not contain 6,000 inhabitants. Its population consists now of full 20,000, who have recently enjoyed the empty honour of figuring in the ineffective schedules of two or three abortive Reform Bills. Its mineral fertility was early recognized; but in the absence of scientific appliances, the hostility of the powerful, and the abundance of

surface-fuel, few were inclined to risk their lives and their money in doubtful and discountenanced operations. Men were fined even at the commencement of the seventeenth century for disfiguring the earth with their coal-digging. The "popinjay," whose complaint about the digging of villanous saltpetre so pestered the hot temper of Percy, could not have entertained a stronger aversion from unnecessary delving than those good lords who enjoined, with attendant heavy penalties for disregard, all who had opened out pits to fill them up again immediately. About the middle of the eighteenth century, one or two coal-mines in the township came to be held on lease. The yield, not exceeding a few tons a day, was consumed in the district. The price was but a shilling per ton. Coals are now sold at the pit mouth for four, five, and even six times that amount. Thousands of tons are daily hewn out and brought up to the surface. The consumption, instead of being confined within the district, is affected neither by the fitful turbulence of the English Channel, nor the settled sweep of the Atlantic Sea. Barnsley coal is burnt in the smelting-furnaces, which tempered the good blades that flashed at Solferino. It speeds the Sardinian paddles through the waves of the inconstant Mediterranean. It will soon propel a locomotive within ear-shot of the Vatican.

Such education as was obtainable by his father's means, was obtained for Joseph Locke as soon as he

was capable of receiving it. And so in a couple of years or so more, he transferred his pranks from the homestead to the class-room of the Barnsley Grammar School. It has since been improved by the donations, and recently endowed by the affectionate munificence of the widow of its most distinguished scholar. It even now scarcely deserves the name it bears. Its pretensions to the title in those days were simply ridiculous. What little was taught was, doubtless, as was usual in those sterling but severe times, taught well; but it was very little, and they who taught that very little, conceived that nothing could be taught at all without supplementary kicks and cuffs. The character of the school may be guessed by its being stated that one of his sisters remembers to have attended the school with him, and that, though she used to be amazed at the neglect with which he treated his tasks up to the last moment, the concentrated determination with which he then attacked, and the accurate rapidity with which he mastered them, even these did not save him from having to endure, nor her from the probably far more severe pain of having to witness, a helpless, tender-hearted little spectator, those brutal assaults which a more understanding age condemns and disallows. A wise man may have said, "Spare the rod and spoil the child;" but another wise man has at any rate assured us, and we are beginning to acknowledge the correctness of the assurance, that "your dull ass will not mend his pace for beating." The pedagogues of

fifty years back beat dull and quick alike. And so Joseph Locke came in for his share of this indiscriminating treatment.

Those who best knew and most admired the Joseph Locke of manhood,—and these were ever the same, will be astonished to learn that even this training, stinted as it was, ceased on his attaining the age of thirteen. It might have ceased earlier without any very grave consequences. He was then placed at Pelaw, in the county of Durham, under William Stobart, an agent of the Duke of Norfolk, and one of the most eminent colliery-viewers in the district. Of Mr. Stobart his pupil always spoke in the kindest terms; but against him, as against everybody he ever came across, he had a laughable story to tell. William Stobart was not exempt from the freedom of speech which even among gentlemen prevailed in those honester years, and varied the monotony of his discourse with occasional oaths and objurgations. But whenever he had to descend a coalpit, the man's devout inspiration returned, and he never entered the corf without the pious ejaculation: "Now, Joe, God go wi' us!" With him Joseph remained upwards of two years. At the end of the time, either Mr. Stobart, or probably some female member of his family, wished to display a little brief authority by insisting that he should ride over to the post daily with the letter-bag across his shoulders. A simple matter surely? Simple enough. But dire events, we know, have

sprung from a cause not much more serious. The dignity of man is supposed to be a very important possession. But boyish dignity is infinitely more so. A boy may ride a pony, even for the purpose of bringing letters from the post. But can a boy ride a pony with a letter-bag strapped across him, and yet maintain his self-respect? We have met Joseph Locke walking from the House of Commons to his house in Lowndes Square with a parcel, and not a very elegant parcel, under his arm. But the Joseph Locke of fifteen was neither the member for Honiton, nor an inhabitant of Belgravia. And so this letter-bag became an old man of the sea, to be flung off at all hazards. It was flung off; but with it was flung off allegiance to the house of Stobart. No doubt, a very pretty quarrel was evoked out of this trifling grievance. At any rate Joseph returned to Barnsley. But the quarrel left no sense of anything but the ludicrous. Some years later, Mr. Stobart and his daughter were so delighted with the attentions of a fellow-traveller in a mail-coach in the north of England, that, after he had left them, they inquired of the guard if he knew from whom they had received such considerate courtesy. "Yes," was the reply; "that was Mr. Locke, the eminent engineer." He had recognized them, and so paid them what attention was in his power. His incognito he had preserved from some playful whim.

His return home was warmly welcomed by his sisters, with whom his high spirits, combined with his

marvellous faculty and love of story-telling, made him so prime a favourite. Neither deserted him, even now that he must have been supposed to be rather under a cloud. Despite the unhopeful nature of his position, he informed them that, over the chimney-piece at Mr. Stobart's, was a portrait of the member for the county, J. G. Lambton, Esq.; that he intended to take the name of George in confirmation, as that then his initials would be J. G. L.; and that he would add M.P. afterwards.

But, however pleasant it might be to such young sympathizing souls as these to have their dear clever companion once more among them, to the hard-working father and mother the son's return was an additional anxiety. An opportunity arose for placing him at Rochdale with a land-surveyor, named Hampson. William Locke jumped at it. He hired a gig and horse, and himself drove his son over the bleak black hills which rise between Yorkshire and Lancashire, through which the boy was one day to cleave the iron way of the Sheffield and Manchester. He confessed that the land-surveyor did not appear to be encumbered with excess of occupation; but, desirous of making the best of the situation on his return, rebuked the doubts of his wife and family by urging that Joseph's master was only a young man, just beginning the world. However, he had begun it with a baby, yet without the means of employing a nurse to see to it. The young apprentice was consequently never asked to do anything that bore a

closer resemblance to land-surveying, than to rock the cradle of this baby. Alfred set to watch the cakes of the Saxon housewife could hardly have been more out of place. The man might as well, a few years later, have set one of Joseph Locke's locomotives to draw a go-cart. Riding on a pony, encumbered with a brown leather post-bag, might have been a sorry business; but it was a manly—nay, a divine occupation, compared with the superintendence of these creaking oscillations. His endurance of indignity, even if it had increased, could not put up with this. So, in about a fortnight, he again astonished the family circle by making his appearance, and informing them that he had walked every inch of the road, and why he had walked it at all. And to prove that he yet loved his story and his joke, even when they told against himself, he added that a labourer who had seen him walking at the top of his speed across Blackstone Edge, had shouted after him: "Eh! but thou art a swaggering fou!"

The younger members of the household could but laugh; the graver could not blame. Doubtless, to the average mind, whether it be boy's or man's, "*fais ton fait*" is a sound edict. Do what is set you to do, and do not trouble yourself about doing anything else. In ninety-nine cases out of a hundred, the fact that a man finds himself in a certain position is a sufficient reason why he should remain in it. Possessed of no special talent, he will never be able to do anything remarkably well; and as he is

sure to do everything rather indifferently, he had better stick to what he has got hold of, and do his best with it, rather than waste time in getting hold of something else, with which he will certainly do no better. He is evidently the ballast, not the sail; qualified to trim, not to steer the ship. And others will be better able to direct its course, if he will only be good enough to sit still. What agitation is needed for its progress will never proceed from him. But there are exceptional minds; and if these accepted as final the first task imposed upon them, there would soon be an end to Progress. The odds are very great against the first being the right one. Their consciousness tells them the way in which they are directed is not the way out; their faith tells them that there is a way out; and their brave hearts and stout courage assure them that in time they will find it. Rocking cradles was not the way out for Joseph Locke. What was, he did not yet know; but he knew well enough what was not. Had he never found it, but gone on rejecting and complaining of his opportunities to the last, his life would not—or, at least, should not be written. We doubt the genius whose opportunity never comes. Many a man has failed in the estimation of his contemporaries, and even at last in his own, whose ultimate success posterity has acknowledged in the acceptance of his opinions, and the grateful veneration attached to his name. The triumph of genius, far more than that of revenge, “came, cometh, and

will come." But even if we grant the possibility of genius against the fact of failure, the less said about it the better ; since, however sophistical the reasoning, and however false the conclusion, the vanity of myriads who fail will soon come to ascribe their disappointments to the superiority, rather than to the inferiority of their merits. Than such a state, what can be more unwholesome? Joseph Locke succeeded in a wholesome career, by wholesome means. That is why we chronicle and insist on his early disappointments.

CHAPTER III.

THE CLOUDS DISPERSE.

IT was not a very difficult matter for a boy of sixteen to walk, knapsack on back, over Blackstone Edge, nor a very grave display of insubordination to refuse playing lullaby to a land-surveyor's firstling. But it was by no means a simple thing for him to suggest, and a still less simple thing for a father who had met with difficulties enough in finding it for himself, to obtain for him an employment at once congenial and remunerative. The lad, naturally enough, could suggest nothing. The father saw nothing else for it but keeping him at home and making him as serviceable as was possible.

The home speculation was not likely to turn out very successful. Even if we reject the French assertion that the domestic idea is a sign of backward civilization, we cannot refuse our assent to the doctrine enforced by historical experience, that home is not favourable for the development of signal abilities. Although a well-known Latin line has been satisfactorily paraphrased by Doctor Johnson in his verse, "Slow rises worth by poverty depressed," a sly and ingenious commentator might urge that Shakespere

has unwittingly translated it more appropriately in his assertion, that "home-keeping youths have ever homely wits." The world's work is not done by the family fireside. In comfortless chambers, ignorant of what have been well called the "graceful results of feminine superintendence;" in severe offices, where a petticoat would be an impertinence and sympathy an impediment; in places and in scenes where the labour is stiff, opposition stiffer, and encouragement altogether absent,—great works are accomplished and great men made.

However, William Locke never troubled himself with considerations such as these, and it never entered his head that his son was to be a great man. He was himself manager of Messrs. Porter & Company's colliery, and glad of assistance which he could control. He took his son under his own direction. Joseph was mostly employed in the office, where he manifested that easy mastery over figures comparatively simple which he displayed, later on, over calculations intricate, and to others perplexing. But it often happened that his time was not sufficiently occupied with a pursuit, at least congenial to his tastes, and somewhat in keeping with his talents. In order to fill up the surplus time, he was not unfrequently set to do "odd jobs," from which his reasonable sense of superiority revolted. There was one office peculiarly distasteful. In those days, coals were sold for the most part at the pit mouth, and the trade of "leading" them was a remunerative one. At times, when

there was nothing else for him to do, the manager of Messrs. Porter & Company's colliery would make his son "lead" coals in a cart of his own to houses in and about Barnsley. So mortified was he at what he deemed his degradation, that whenever he saw any one coming whom he recognized, he would lie down in the cart, in order to avoid being seen. And though his pocket-money was, doubtless, scanty enough, he was in the habit of paying a man threepence to "lead" the coals, for the latter part of their journey, to a house whither he was occasionally sent on this hateful errand. There can be no doubt that at this time the poor fellow was intensely miserable. He had no settled occupation, and what occupation was provided for him, was altogether disproportioned to his powers and wants. In his essay upon Burns, Carlyle indignantly declaims against a Courser of the Sun being harnessed to a beer-cart. The embryo engineer was not less hardly dealt with. Even at that early age he must have had some suspicion of his own capacity; for in his more cheerful moods with sympathizing young friends, he did not hesitate to declare that he would one day "enter Barnsley on horseback with a groom behind him," and that he wished for nothing better than to ride over the pit-hill where he was so irksomely employed, say "Good morning, Porter," and disappear. On horseback, probably he never entered Barnsley; but the day came when he entered it and found its townspeople awaiting him at the station which he had come

to open,—awaiting him with vociferous cheers, and all those manifestations of sincere admiration which they could not but feel for the distinguished man who had spent his early days among them. For “so the whirligig of Time brings in its revenges.”

But, until Time does bring them in, the sense of the oppression of circumstance, the hunger of talent for opportunity, weigh heavily upon the restless young spirits who can neither find nor make it. So general is this hardship in the early lives of successful men, that we cannot but regard it as the providentially imposed part of their education. It is the dark cloth wrapped round the cage to make them sing the right tune. Most, if not all, successful men come, ultimately, to see the significance and utility of their miseries undergone, and look back upon Time as the kindest of taskmasters. But the task is bad to bear. And so irksome was its endurance to young Joseph Locke, that we believe he had formed the determination of going to America,—not with any definite plan, but from the desire to escape from a situation that appeared to him so barren of hope. George Stephenson is said to have entertained a similar project considerably later on in life, but a little earlier on in point of time. Historians have dwelt upon the possible result to the world, if Cromwell had been permitted to carry out his intention of traversing the Atlantic in search of a land where the divine right of kings was unknown. The political revolution of the seventeenth century would have been considerably retarded by the absence

of him who became its leader. But it would not have been more retarded than would have been the English industrial revolution of the nineteenth century if both George Stephenson and Joseph Locke had carried their energies, perhaps only their discontent, elsewhere. So utterly miserable was Joseph Locke at this period, that he has confessed he once went and lay down in the fields, and cried like a child. "Beware of the man," says Bulwer Lytton, "who boasts that he has never wept." There are some tears more potent even than those of Helen; and even from them sprang a plant whose leaves cured the bite of serpents.

Still, we cannot conceive that, when matters were at their very worst, young Joseph Locke was generally other than a very cheery fellow; and such, we are assured, was the case. He had put into a raffle, with the ambition of obtaining a fiddle. Raffles, however, are coy, and not to be relied on; and the fiddle fell, as greater windfalls ever fall, into the hands of somebody who either had little want of it, or did not want it at all. Alfieri tells how he became possessed of his copy of Ariosto. Every Sunday the boys at the academy where he received the rudiments of scholarship used to have half a chicken for dinner. He sacrificed his half-chicken for three successive Sundays to the owner of the coveted book, and so ultimately became its possessor.* Joseph Locke had, probably, no half-chicken to give; and the fiddle had fallen into the hands of some one who seems to have

* Vita scritta da Esso, Epoca seconda, cap. ii.

been more in want of liquids than solids; and if Joseph would only carry him so many cans of water, he should have the fiddle. The water was transported; and he amused his playmates now by interspersing his droll stories with music that was in all probability equally droll. But there was another mouth that often wanted water, of which he was more negligent. His father had bought a cow, and this cow was the plague of his life. He was frequently summoned from his merry pastimes to attend to this beast, drive her to the well, and see her safe again in her stall. He detested both her and the occupation which she entailed upon him; and when one morning he was called at five o'clock to go and hand her over to a purchaser, whose offer William Locke could not resist, he declared that he had never got out of his bed so willingly in his life.

He was now close upon eighteen years of age, and was doing what office-work there was for him to do far too easily for the work to be of any use in educating or controlling him. Whilst matters were in this state, the following letter arrived one morning for William Locke. It has not before been printed; and as it has a special interest of its own, both with regard to him whose life we are narrating, and the remarkable man by whom it was written, we do not hesitate to transcribe it in full :—

To WILLIAM LOCKE, ESQ., Colliery Agent, near Barnsley.

KILLINGWORTH COLLIERY, *March 31st, 1823.*

DEAR SIR,—From the great elapse of time since I saw you, you will hardly know that such a man is in the land of the living.

I fully expected to have seen you about two years ago, as I passed through Barnsley on my way to South Wales; but being informed you were not at home, I did not call. I expect to be in London in the course of a fortnight or three weeks, when I shall do myself the pleasure of calling, either in going or coming. This will be handed to you by Mr. Wilson, a friend of mine, who is by profession an attorney-at-law, and intends to settle in your neighbourhood. You will greatly oblige me by throwing any business in his way you conveniently can. I think you will find him an active man in his profession.

There have been many ups and downs in this neighbourhood since you left. You will no doubt have heard that Charles Nixon was thrown out of Wall-Bottle Colliery by his partners some years ago. He has little to depend on now but the profits of the ballast-machine at Wellington Quay, which I dare say are very small. Many of his family have turned out very badly; he has been very unfortunate in family affairs.

If I should have the pleasure of seeing you, I shall give you a long list of occurrences since you and I worked together at Newburn. Hawthorn is still at Wall Bottle.

I dare say you will remember he was a great enemy to me, but much more so after you left. I left Wall-Bottle Colliery soon after you, and have been very prosperous in my concerns ever since. I am now far above Hawthorn's reach. I am now concerned as civil engineer in different parts of the kingdom. I have only one son, whom I have brought up in my own profession. He is now nearly twenty years of age. I have had him educated in the first schools, and he is now at college in Edinbro'. I have found a great want of education myself, but fortune has made me amends for that want.

I am, dear Sir, yours truly,

GEO. STEPHENSON.

I hope Mrs. Locke and your family are all well. My best respects to them.

The proposed visit was paid. We can well imagine, from the friendly tone of the foregoing letter, what talk would flow between the now rising George Stephenson and the hard-working William Locke,

who had toiled together years back, and for so many had not met. Doubtless, the scenes enacted at the old Water-row Pit were gone through over again; and how the time elapsed since they parted there would be minutely accounted for. Each had to tell of rare struggles; one had to tell of rare success, and was already in receipt of an income which to the other seemed enormous wealth. And when as much was avowed, "I'll tell you what, Locke," was the answer, "when I was making three shillings, I thought myself a very clever fellow; but when I got among the engine folk, and could earn three guineas a day, I could na' put my mooth in order to ask it."

But when a natural and pleasant egotism had come to the end of its story, George Stephenson could not fail to remark the young fellow with the clear blue eyes, who had listened intelligently to so much of the conversation as he was permitted to hear. "What is he doing?" was the question frankly put and frankly answered. The visitor suggested that he might be employed to better purpose. The host did not seem to think otherwise. "Send him to me," was all the remark of George Stephenson. So to George Stephenson he went, towards the close of 1823, being then at the commencement of his nineteenth year. The father was to pay no premium; the son was to receive no salary for three years. He was to learn his business, and make himself useful. How thoroughly he succeeded in both objects will be shown. He had

got his hand put to the right plough, and he never turned back.

George Stephenson's workshops at Newcastle had now begun to make some noise in the world. In them Joseph Locke had the very best opportunities of displaying his energies, but was not debarred from opportunities of increasing his information. His days were active: his evenings were studious. Brought face to face with genuine work that had in it much that was difficult, but still more that was, by its importance, encouraging, he soon learned the pleasure that resides in honourable and resultful toil. It was in no small office close to a pit-mouth, where sufficient for the day was the work thereof, that he now liberally expanded his faculties. He was co-operating in works which he at once perceived were even more grave in their consequences than in their magnitude. His chief was already a great man, at least in the North of England: his fellow-workers were all fairly started on a career whose success it remained with them to carry beyond the present limits of their master's. Ambition is contagious among the young; and Locke was not likely to escape its ennobling influence. If it as yet produced no effects external to himself, it brought a vast change within his mind. It turned his attention to the fact of his own ignorance, to the lamentable shortcomings of his scanty education. Most people consider education closed when they fling the school or the college behind them. The mistake is equally great, and the consequences equally

deplorable, even when the state of pupilage terminates at the age of twenty-three. But Locke had left school at thirteen, and had not learned much since. He was now close upon twenty. He forthwith put himself in harness. Practical education of the most valuable kind he received in the workshop; theoretical, but not less valuable education, he obtained for himself at his lodgings. He applied himself to the study of mathematics with assiduity; nor contented himself till he had mastered everything then attainable in physical science which could contribute to equip him for his future profession. The aids to instruction in a position such as was his at that period, were not what they have since become. Mechanics' Institute was not a household word: the schoolmaster was not yet abroad. Difficulties were many, encouragements were few; and it was only by the earnest and the hopeful that these were dispensed with and those overcome. The joyousness of Locke's disposition enabled him to see no obstacles, where others would have seen an insurmountable bar. And during the whole time spent at Newcastle, he worked steadily and steadfastly at that self-improvement which he could not but feel he so much required, but from which the service and labours of every day might so easily have tempted him to hold himself excused. Had he listened to such temptation now, repentance would have come too late to be availing. Far more serious and more monopolizing labours were approaching; and then the most sincere desire for mental cultiva-

tion would be in vain. Never was there an instance in which relaxed energy would have been more disastrous. Never was there an instance in which such possible disaster was more resolutely avoided.

The years passed at Newcastle were comparatively uneventful, for the simple and satisfactory reason that they were busy years of silent preparation. Turbulently spent, they might have been more replete with interest for the curious. Calmly spent, and with a set purpose, they are interesting to those who, if not keeping them in consideration, would be lost for an explanation of the fitness which he was soon to manifest for responsible emergencies and for gigantic undertakings. All that one of the survivors of those who worked with him at Newcastle has to say of him is, "that he worked hard, was a quick, determined student, and an excellent swimmer." Earnestness and concentration were the characteristics of his youth. Earnestness and concentration were to lead him rapidly on to fortune.

CHAPTER IV.

ROADS AND ROAD-MAKERS.

THE Romans owed the permanency of their dominion, for upwards of 600 long years, quite as much to the way in which they handled their spade, as to the way in which they handled their sword. They may be said not so much to have fought as to have dug their way up to empire. To win a battle was, indeed, a small stride in the path of conquest. The most important part of the business was to secure the advantage thus gained, by linking the invaded country to that admirable network of roads which, issuing from the apex of the Capitol, reticulated the whole of their vast empire, and bound up its most dislocated parts in one corporate union. The highway served the double function of artery and ligament, not only knitting the scattered provinces into one system, but circulating the life-blood of the Capitol through the most distant boundaries of the Empire. The Roman armies were essentially road-makers and bridge-builders. Instead of festering in cantonments, or laying traps for ingenuous innocence, they were made to issue forth with pickaxe and spade to consolidate what they had won. To Rome the world was a school, and she exercised over its inhabitants the

discipline of the pedagogue. If she held the rod with one hand, with the other she imparted humanizing arts, and diffused among the savages she had conquered the rudiments of civilization.

The Romans, if we may judge from the works which have come down to us, arrived at great excellence in the department of engineering. The aqueducts which brought the Claudian waters to Monte Clelio, still lift their smiling faces into the blue air, and seem as fresh as if they had arisen only yesterday. The arches seem more durable than any of those by which Brindley carried his water-proof canals over the rivers of Lancashire, and certainly not less symmetrical than the best which Rennie flung over the valleys of North Wales. Their bridges, as well as their roads, were stamped with the same imperial character. Macadam might raise a smoother surface, but highways more majestically sweeping, more durable, more massive, and strong, neither Macadam nor any of his rivals could construct. They formed, even in their flat stony roughness, a fit pavement for the masters of the world. Concentrated in the Temple of the Capitoline Jupiter, they led the legions, after emerging from sacrifice, to launch the thunderbolt of war, as if direct from the hand of Jove himself, over remote nations. Up mountain, across morass, through forest, the highway sped, bridging over gulfs and linking continents, until it landed upon the new or rebellious territory all the chivalry of Rome. But when the Capitol, tired of her baby dominion, let her school-

boy subjects go, there were no more roads to make, or bridges to construct. The bonds of discipline were relaxed. The army got into dissolute ways, and the Empire first tottered and then fell to pieces.

It is singular that so useful an art as road-making, having once been thoroughly known, should, in the lapse of succeeding ages, have completely died out. But remissness and languor produce barbarism by a descent as steeply inclined as that down which mankind are driven by degeneracy of manners; and during the decline of the Empire its subjects became not only sluggish, but dissolute. First, the roads vanished under accumulating strata. Bridges were broken down as a security against ruffianly invaders. Population either died out or was drifted into other quarters; so that fresh needs sprang up, to supply which the old highways proved inapplicable. The ligaments of the Empire being removed, the process of disintegration set in, and did not stop till it had reached its utmost limit. Not only province became divorced from province, but city from town, and hamlet from city. Even villages grew up into isolated entities. High roads across morass and river, instead of being useful, would have been pronounced a curse, owing to the extreme facility which they must have afforded to those troops of barbarians who came no one knew whence, and emerged no one knew how, to carry fire and sword over the country which they had selected for the honour of their visit. England, owing to the easy means of access it afforded to the rovers of the

ocean, was particularly subject to incursions of this character. The Romans had left the inhabitants with just sufficient civilization to destroy their martial ferocity, but without sufficient to enable them, with dexterity, to protect themselves against the inroads of their barbarous neighbours. Hence they became a prey, after the contraction of the Empire, to every troop of Danes and Norwegians who chose to favour them with their presence. Roads, therefore, were broken up, bridges destroyed, and the country left a trackless waste, that the invader might encounter such obstacles from the state of the country as would deter him from extending his march far inland. The inhabitants chose rather to live disconnected with each other than that they should, by intercommunication, become a common prey to the aggressor.

Perhaps this complete disruption was necessary, that the old civilization might die out, and from its ashes the first seeds of a new civilization spring. The invaders who conquered the country opened out roads, believing themselves strong enough to hold their conquest against the world. The Church, which had played the chief part in knocking the old system to pieces, was bound to assist in putting another in its place. The ecclesiastical organism subjecting distant places to the visits of the same religious officers, the necessity of movement from place to place, the mapping out of the country into dioceses and parishes, gave rise to a system of sur-

veys, and opened out those old roads which still intersect its surface. A distinct order of monks was founded for this special purpose, who were called Bridge-Builders: chapels were erected on the line of their operations, and the traveller importuned for alms to keep their structures in repair. To encourage these undertakings, indulgences were granted to all who should assist or in any way contribute to the work. St. Benedict laid the basis of his own canonization with the first stone of the famous bridge of Avignon, which, says Pope Nicholas the Fifth, was built by the inspiration of the Holy Ghost. To build a bridge or clear a forest were deeds of salvation for the next world as well as for this; and hence to make a highway on earth seemed the most effectual road to Heaven.

These promises, however, of a spiritual kingdom do not appear to have gone very far to make the world inhabitable. In their royal progresses and the movement of their armies, our early kings met with serious blockades, which they could only remove or diminish by making the repair or construction of roads chargeable to the district whose utility they subserved. But as visitations of this sort were unfrequent, royal mandates were mostly neglected, and both parishes and counties had little idea of keeping up any roads but such as they found convenient to themselves. There was no ostensible legislation on the subject of road-making until the monasteries went to pieces, which shows that the monks had more to do with

their repair than is commonly supposed. Turnpikes came into existence with workhouses. Large tolls were levied without the highways exhibiting any sensible improvement, just as poor-rates were collected while the public thoroughfares swarmed with beggars. The people rose in large bodies against these new gate-keepers, mistaking them for exactors of royal benevolences in disguise. Government did not actively interfere in improving the state of the public roads, till the obstructions which the royal army met with in crushing the Scotch rising in favour of the Pretender, opened its eyes to the dangers of the situation. Even then its efforts were confined to such thoroughfares as link the country with Scotland, and ceased when those thoroughfares were secured. The Crown, in early days, was eager enough to raise money and collect forces for a raid in France; but the thought of applying any portion of its revenues or of the labour of its minions to the improvement of internal communication, never entered its head. Whatever advantages government may have conferred upon society in other respects, with regard to the real progress of the country in the arts of industry and civilization, it has done little more than obstruct the course of success. Every amelioration has sprung from the ingenious activity which the people have displayed in satisfying their own needs, and overcoming the difficulties which impeded their industrial development.

The greatest strides in inland communication have

been made neither by war nor religion, but by commerce. Villages, soon to expand into large towns, early found out the advantages which cross-roads conferred upon them, in leading to a facile interchange of commodities. Causeways were laid down of flag or oblong pieces of stone, to afford, on wet soil, a firm tread for the laden horse or passenger. First pedlars, then pack-horses, and subsequently waggons, became the principal channels of conveyance. Owing, however, to the imperfect state of the roads, pack-horses remained the great medium of interchange up to the middle of the eighteenth century. Occasionally alone, but mostly in groups, horse tied to horse, and following each other in one continuous line, they brought the wools of Yorkshire into the storehouses of Liverpool, or the velvets of Spitalfields into the markets of Manchester. The requirements of the country adapted themselves to these imperfect means of communication. The population being scanty, and the articles of luxury few, neither the railway nor the canal could have served any purpose then contemplated, or supplied any want then felt, had they been in existence. Even the machinery of barter was economized. Instead of large shops in the principal thoroughfares of bulky towns, keeping their stores open to the public fourteen hours a day during the live-long year, there were periodical fairs held in convenient localities, at which the bailiff hired his servants, and the housewife laid in her winter or summer stock of provision and clothing apparel, concentrating

that shopping in a day, which the modern family distributes in dribblets over every portion of the year. Clothes for the most part were made, as was the wont of the ancients, in the interior of the household. As huckstering was only a half-yearly incident, the domestic affections and the finer susceptibilities of nature had far more spontaneous growth than where it is a daily habit; and the eye of the fair, bent upon the distaff or the loom, instead of the pages of a mawkish literature, did not enfeeble the head by corrupting the heart.

But soon more commodious means of transit and exchange were forced into being by the necessities of the situation. With population the supply of luxuries increased almost in geometrical ratio. Coaches were started, ambulances and waggons multiplied. Boats on navigable rivers were turned to account in the interchange between city and city. It soon became apparent that those ports flourished most which commanded the readiest means of internal communication, as those inland towns flourished most which had the easiest access to the sea. While Manchester sent its manufactures on pack-horses to the river Severn for shipment to Bristol, the town did not thrive in any great proportion. The port of Liverpool was simply a village of secondary importance to Chester; but when the Mersey and the Orwell became navigable, Liverpool expanded into a large town, and Manchester as a cotton mart bid fair to become the emporium of the world.

If there is one phenomenon more than another apparent in the mercantile history of the country, it is the constant advance of its commerce over the means of transit provided to meet its requirements. At the end of each quarter of a century there was a constant cry raised of a glut, and a demand for increased facilities of transport and communication. Thus rivers were hardly made navigable before it was discovered that a network of canals was necessary; and before the country could be properly reticulated with canals, it was discovered that water-courses were too slow, and more quick means of transit were imperatively demanded to meet the rapid extension of commerce. Brindley and Rennie, by covering the North with canals, made Liverpool shoot far ahead of Bristol, and imparted to Manchester a metropolitan cast of thought, with that wealth and prestige which makes its existence far more important to Europe than either Madrid or Vienna. Canals were the passion of the day. Britain became intersected by upwards of 3,000 miles of these channels of commerce, at a cost of fifty millions sterling. They perforated hills, spanned gulfs, bridged rivers, and, where no other means were applicable, by a system of hydraulic pressure, they wafted the heaviest merchandise from the depth of the lowest valley over the summit of the loftiest mountain. In the flat countries of Belgium, Holland, and France, canals were of easy construction; but among the hills of the North, where the great seats of English manufacturing

industry lay, they taxed to the utmost the most practised engineer's skill. To send merchandise skimming through the bowels of the earth, or to hang it suspended in the air, hundreds of feet over navigable rivers, was no slight accomplishment. Yet the feat had no sooner been executed upon an extensive scale than the stimulus it gave to commerce, by quickening the rate of consumption, and cheapening the price of vendible articles, called for still more commodious means of transport. Notwithstanding waggons and coaches on the highway, ships on the river, and barges on the canal, Manchester and Liverpool declared they could not meet the wants of their increasing trade unless quicker modes of communication were devised. Commerce was threatened with strangulation, for bales of goods ready for despatch choked the way. But relief was at hand from a quarter whence it had been least expected; which was destined more than any other event since the Reformation to change the aspect of the country, and which enabled the merchant to transmit as many goods in one week as all the old modes of conveyance put together could with difficulty transmit in one year.

It was early a problem in the mining districts of Newcastle how coal could be hauled from the pit's mouth with the least inconvenience for shipment at the river. With this object wooden rails were laid down by Mr. Beaumont at the commencement of the seventeenth century, as it was supposed that the waggon-wheels resting on a smooth surface would

diminish friction, and thereby render horse-power more effective in dragging the coal from the pit's mouth to the hatches at the river-side. In some places these wooden roads extended over nine or ten miles, and one horse was sufficient to haul sixty bushels of coals along them. From Newcastle this invention extended to Scotland, and was applied to the metallic works of Shropshire and Sheffield. But wooden rails exposed to wet and constant friction were not sufficiently durable, and cast-iron rails were early substituted in their place. A further improvement was made in having the flanges cast on the tire of the waggon-wheel, to keep them on the track, instead of on the rail itself. In 1800, stone props were used instead of timber for supporting the jointure of the rails by Mr. Outram, of Derbyshire, from whose name they derived their cognomen of tram-roads. At this time their adoption was general, whether in removing stone from quarries, iron from smelting-works, or coal from mines. It was this new principle that the two chief towns in Lancashire were anxious to try, with a view to the removal of the blockade of goods which choked their storehouses. Manchester had started the first coach; she had necessitated the construction of the first canal; she busied herself in the construction, for travelling purposes, of the first lengthy line of railway. The survey was entered upon for the construction of a new iron highway, as direct as the levels would permit, between Manchester and Liverpool, in 1825; but Parliament negatived the under-

taking. The line was first surveyed upon the assumption that the waggons would be drawn by fleet horses at the rate of ten miles an hour. The company relied upon the goods traffic as the great element of their profits. It was not contemplated at the onset that coach conveyance would be much interfered with. But men were brought in connection with it who were training up a new agent, destined to overthrow all their original conjectures, and to make their enterprise far more successful than the most sanguine of the company ever dreamt of, by not only concentrating the passenger traffic upon their new line of route, but making that passenger traffic twenty times greater than it ever was before. Mr. James, the first surveyor of the line, was intimate with the rising engine-wright at Killingworth Colliery, George Stephenson, who had already signalized himself by constructing successful railways at Hetton and at Stockton and Darlington, and he introduced him to the directors of the Manchester and Liverpool Railway as a competent person to undertake a second survey, and to execute the works after the legislative sanction had been secured. But this sanction was only obtained by great energy and persistent manœuvring.

Let us see what the new agent was which Mr. Stephenson brought under the attention of the company, and how it assumed that living organism which is fast changing the social aspects of England, and promises to revolutionize the habitable globe.

CHAPTER V.

PROMETHEUS.

THE ancients appear to have been acquainted with the elastic properties of steam, and of its power to shatter any load which excluded vents or denied it egress. Aristotle, Seneca, and Pliny ascribe earthquakes to this cause. They even went so far as to assert that those frightful commotions which in a few seconds drive the ocean over its boundaries and cast up dangerous rocks within unfathomable seas, or upheave lofty mountains from a wide expanse of plain, were entirely owing to the sudden conversion into steam of some great body of water. But hardly anybody besides a few designing priests turned it to account. Ancient history informs us that on the banks of the Weser the god of the Teutones sometimes showed himself unpropitious by a sort of thunder-clap, immediately succeeded by a cloud which filled the sacred enclosure. The statue of the god Basterick, subsequently discovered by excavations, clearly revealed the method by which the pretended miracle was effected. The god was of metal. The head was hollow, and contained nine gallons of water. Wooden plugs closed up the mouth and another opening above the forehead. Live coal, dexterously

placed in a cavity of the skull, gradually heated the liquid. The generated steam quickly forced out the plugs with a loud report ; it then escaped with violence in two streams, and raised a thick cloud between the deity and his stupified worshippers. It would appear that in the Middle Ages some monks found their account in this invention, and that the head of Buserick has performed its office before other than Teutonic multitudes.

Anthemius, the architect of Justinian, to revenge himself on the orator Zeno for having gained an action in a dispute relative to the walls of their contiguous houses, kindled a fire beneath some caldrons of water which he had conveyed in a lower room, and connected by flexible tubes with the posts and rafters of the adjacent buildings. When the steam of the boiling water ascended through the tubes, the house was shaken by the effort of the imprisoned air to escape, and Zeno was forced to declare to the senate that he must yield to the power of an antagonist who could shake the earth with the trident of Neptune.* Yet this gigantic power, so simple in its origin and so easy in its application, was allowed to run wild in the laboratory of nature, without any attempt to utilize it for upwards of two thousand years. Among the Greeks the only invention we find in connection

* For this exploit of Anthemius, see Agathias, "De Imperio et Rebus gestis Justiniani," lib. v. Paris edit. 1660, pp. 150, 151. Gibbon gives the testimony which Procopius (de *Ædificiis*) bears to the skill of Justinian's architect.—(Roman Empire, chap. xi.)

with it was a play toy of Hero of Alexandria, which he called *Æoliphyla*, or Ball of *Æolus*, consisting of a metallic sphere upon swivels, with a tube attached to the side, having one of its surfaces bored through by a large gimlet near the end. Through this aperture the vapour, obtained by heating the water in the ball, escaped, driving the ball round, by the force of the recoil, in a contrary direction. We hear nothing further of this exploitation of vapour till 1615, when a book was published at Frankfort, by Solomon de Caus, which professed to raise water by means of steam. The contrivance was of the simplest character. A sphere half filled with water, supplied with a side-tube and stop-cock to let in, when needed, a further supply, was placed over a fire. Another tube, soldered into the sphere perpendicularly, communicating with the water, of which it nearly touched the bottom, formed a natural duct up which the water was forced as its surface was depressed by the action of the vapour generated by the heat.* The Marquis of Worcester, who visited this man at the Bicêtre, where he was confined as a madman, for annoying Richelieu with projects which at that time seemed as idle as a railway to the moon, was wonderfully struck with the appearance of the man, and accepted his invention as a marvellous discovery. While in prison himself in England, on a charge of being a spy of Charles II., aided by

* *Les Raisons des Forces mouvantes, avec diverses Machines tant utiles que puissantes.*

Solomon's hints, he devised what he called "his marvellous water-commanding engine," which, upon the Restoration, he gave, with great flourish of trumpets, to the world.* It was, however, nothing more than an extension of Solomon de Caus' device, arranged upon the principle of a continuous stream of water through the conduit of supply. According to the calculations of the Marquis, one cubic foot of water would raise forty cubic feet as many feet high. The surveillance of one man would keep the entire machine in working order. We do not know that the scheme of the Marquis was ever reduced to practice. He recommended it to the corporation of London for raising water from the Thames for the supply of the city. But the corporation viewed the thing with immense distrust, as a wild freak of a disordered fancy. Yet he imagined, with Horace, that his fame, on account of the invention, would be more durable than the Pyramids, and that the King might reap such a treasure from its application as would make him the richest monarch in Europe.

Nothing further occurred relative to steam machinery till the days of Papin (1690), except the attempt of Moreland to strip Worcester's scheme of its rhapsody and present it to the nation in a sober dress. Steam was proved to occupy two thousand times more space than the bulk of water from which it was generated; and if its expansive power could not find an outlet, it was shown to burst the

* Scantling of One Hundred Inventions, No. 68 : London, 1663.

thickest cannon. Papin, by bringing this power in connection with the piston and closely-packed cylinder of Otto Guericke's air-pump, may be said to have created the steam-engine. At all events, the nucleus was there. He, however, never carried his design further than to construct a little model to test the principle. The sole means he had, though he averred that there were a thousand other *faciles à imaginer*, to condense the steam in the pump after raising the piston to its full height, was to remove from beneath the metallic stand of the pump the fire which heated the water. The piston then descended by the force of the atmospheric air, until the application of the fire generated the vapour which lifted the piston again.

France, as usual, started the idea, but left it in the air. England immediately stepped in to reduce it to practice. Savery constructed large machines for raising water upon the principle of Solomon de Caus. He also worked out Papin's design upon a large scale, condensing the vapour after it had raised the piston, by syringing the cylinder of the pump with cold water. Newcomen and Cowley, two ingenious operatives, constructed machines upon the same principle, with the difference of enclosing the walls of the pump in an outer cylinder, with the view of effecting the condensing of the vapour by keeping a current of cold water between them. But at the commencement of the eighteenth century the art of constructing pumps perfectly cylindrical, and of fitting to their interior movable pistons, so as to

close the passage hermetically, was very little understood. In the machine Newcomen and Cowley constructed in 1705, the steam was hindered from escaping through the interstices between the surface of the cylinder and the edges of the piston by a layer of water, which, just covering the top of the piston, filled up any small lacunes imperceptible to the sight. On one occasion it was discovered that the piston worked with much greater quickness than usual. After some inquiry into the phenomenon, a small hole was discovered in the piston, through which the cold water fell in drops on the vapour below, and effected a more rapid condensation than usual. From that time steam machines were accompanied with a daggling apparatus to discharge the function of condensation by interior injection, which this accident showed to be far more efficient than exterior condensation.

The first machines of Newcomen required the constant attendance of a person to open and turn off the steam and injection cocks at the precise moment required. Tradition attributes to a lad named Humphrey Potter the first invention of a mechanism by means of which the engine itself would become self-acting, and turn the cocks in regular rotation at the required moment. Potter, annoyed one day at not being able to join his companions in their sports, tied the cock-strings to the lever, the tractions of which, as the lever rose or descended, replaced the efforts of his hand. Brighton perfected this rough

device of the cock-boy by suspending a plug frame from the balanced lever or beam, which by tappets acted on levers attached to the injection and steam cocks, and opened and shut them as they might be adjusted. But now the distribution of the steam is effected by a more simple means than the plug frame. Mr. Murray, of Leeds, in 1801, substituted in its stead an eccentric wheel, attached to the axle which the machine turned. This wheel during each of its revolutions gave rise to two opposite movements, which, by opening and shutting a pair of valves, sufficed to send the steam both above and below the piston, and to impel the steam already spent into the condenser.

A pale young man, of feeble constitution, happened, in the middle of the eighteenth century, to have charge of the physical instruments in the University of Glasgow. In this capacity he was intrusted with a model of Newcomen's engine to repair. He soon discovered that the weakest point about the machine was the slowness with which the piston effected its operation, owing to the obstacle which the imperfectly-condensed vapour opposed to its descent, and the coolness the injected water imparted to the cylinder, which neutralized the expansive force of the incoming vapour as the piston arose. To remedy these defects, he constructed an air-pump apart from the cylinder of the piston, called the condenser, which he connected with it by means of a narrow tube. The vapour, after filling the first cylinder, distributed itself over the interior of the air-pump, into which it

was completely driven by the descending piston. The cylinder of the condenser was kept perfectly cool by a current of cold water ; that of the engine was maintained at a constant temperature of 100° by separation from the condensing junction, by the friction of the piston, and by perpetual contact with hot vapour. The evacuation of the air-pump was effected by the handle of its piston being attached to the balance which the machine put in motion. While kept constantly cool, it was kept constantly empty. To secure still more the required temperature in the steam-cylinder, he encased it in a cylinder of wood, and kept up a current of hot water between the two enclosures ; following in this respect the expedient of Brindley, who, however, packed the interior space with hot ashes instead of using hot water. The inventor sold the right of employing the condenser at the price of one-third of the coal used by each machine. The proprietors of a mine at Chacewater, in Cornwall, paid upwards of £2,500 per annum to the inventor for attaching the condenser to a single engine. As they employed three engines, the condenser upon their works alone is computed to have economized coal at the rate of £7,500 per annum. That feeble young man, whose life did not appear to be worth ten years' purchase, was James Watt.

To increase the piston's rapidity of movement to a still greater degree, Watt constructed the machine on the principle of substituting for the action of the atmospheric air, a discharge of hot vapour to force

the piston down as well as up ; thus bringing the steam to act upon it both ways. The power created by this means became double to what the same cylinder would otherwise produce, and was further augmented by an inequality in the length of the lever. To show the effect of these united improvements upon the inventions of his predecessors, it may be stated that one of his Cornwall engines worked a pump of 18 inches diameter, and upwards of 600 feet high, at the rate of ten to twelve strokes of 7 feet long a minute, raising a weight equal to 81,000 lb. 80 feet high in the same space of time ; while in Newcomen's engine this feat would have required a cylinder of the enormous diameter of 120 inches, and could only have operated with the consumption of coal and time four times greater in amount. The pecuniary profits which Watt drew from the adoption of his patents were for that time something extraordinary in amount ; for Newcomen's engines, first set up in Wolverhampton, shortly afterwards found their way to the coal districts of the North of England, and to the leaden mines of Cumberland, as well as to the tin and copper mines of the South. The improvements he introduced, by the saving of coal, enabled the steam-engine to be employed where, owing to the dearness of combustion, it would have been otherwise impossible to have turned its services to account, and drove the old engines of Newcomen from every place where they would be considered of any value.

So long as the action of the piston-rod continued

to be reciprocatory, it was evident the steam-engine could be little more than a machine for pumping water or for raising minerals. Hence, the attention of engineers was early directed to substituting a rotatory for a rectilinear motion. Papin was the first to describe how this object could be effected by means of a crank and an axle; but Messrs. Wasbrough and Pickard were the first to embody his views in a practical form. They worked corn-mills, and manufactured government ship-blocks by communicating steam power to a series of wheels connected with the piston-rod by the means which Papin had suggested. About the same period Watt had directed his thoughts to the subject, being led, as he affirms, to the adoption of the crank by the motion of the turning-lathe. "But as the rotatory motion is produced in that machine by the impulse given to the crank in the descent of the foot only, and is continued in its ascent by the acquired momentum of the wheel which here acts as a fly, and being unwilling to load my engine with a fly heavy enough to continue the motion during the ascent of the piston, I employ two engines acting on two cranks; by which means a motion might be rendered nearly equal, and a very slight fly would only be requisite."

But Wasbrough and his partner had taken out a patent for the crank, and threatened Watt with litigation if he continued to use it. Watt replied, that these gentlemen had got the application of the idea from him through a common workman, and taken out

their patent in the dark, to rob him of the fruit of his brains. Watt, however, was not discouraged. Instead of the crank and axle, he accomplished the same purpose by a perfectly novel combination in mechanics—the sun and the planet-wheel motion, and which was, in some cases, preferable to his rivals' method. Still further by his parallel motion, which brought the double-impulse engine to perfection, imparting motion to the lever upwards as well as downwards; and by his adoption of Clarke's suggestion upon the applicability of the left tenter to equalize steam pressure, Watt accomplished more for the steam-engine up to his time than any other man. By his ingenious contrivances, this colossal agent was first applied to develop the manufactures of the nation. Something like two thousand steam-mills, surpassing the labour of six or seven millions of horses, were spread over the country. Its revenues were quadrupled; its commerce increased a hundredfold. The national riches were multiplied in geometrical ratio, and gigantic fortunes amassed in a few years. At length the struggle came, and the fecund works of a labouring mechanic enabled the country, single-handed, to baffle the might of a conqueror who commanded the resources of the world. Had it not been for the impetus which Watt's inventions had imparted to the industrial resources of Britain, Nelson could not have shattered the navy of Bonaparte at Aboukir and Trafalgar, or Wellington struck down his power on the plains of Waterloo.

The application of steam as a motive power to water-navigation was decided as soon as the rectilinear motion of the piston-rod was changed into one of a rotatory character ; for boats had been impelled through the water by wheels, instead of oars, by Prince Rupert, who employed horses to work the axis. The only step which remained to be taken was to substitute the agency of the steam-engine for the horse-power before employed. Jonathan Hull (1737) was the first Englishman to draw the attention of the world to the manner in which Newcomen's engine might be employed for this purpose ; but we do not know that the design took a more substantial form than a mere specification. M. Perier appears to have been the first who constructed a steam-vessel ; but the matter was so clumsily managed that the boat would not go. An attempt was made on a larger scale in 1778, at Baume-les-Dames, by M. Jouffroy. The same gentleman, in 1781, worked one on the Saone some 90 feet long and 12 or 14 feet wide. The speed, however, was too slow for any practicable purpose. To increase the rotatory action of the wheels, M. Jouffroy built a vessel with two steam-engines at Lyons ; but the French revolution knocked his projects on the head and obliged him to emigrate. The work, however, was quickly taken up by Englishmen. Mr. Millar launched a steamboat in 1791 ; Lord Stanhope launched another in 1795 ; and Symington made the trial of one of his own construction upon a Scotch canal in 1801. To econo-

mize room, high-pressure steam was substituted in the place of the condensing apparatus; but neither Symington's nor Stanhope's, on account of imperfections in the fitting of the boat to the engine, could be made to go more than three miles an hour.

The duke of Bridgewater, who had been advised by Fulton, an American artist, to introduce steam-tugs on his canals, tried the experiment after Symington's model; but the boats built for this purpose damaged the bottoms of his canals and sent the water splashing over the banks, committing such havoc and creating such a belching noise, that the adjoining country folk called them Bonapartes. These boats were also withdrawn, and the attempt at steam navigation virtually abandoned.

The fact is, the action of the low-pressure steam-engine which Watt had continued to use, appeared at the outset too weak to produce quick rotatory motion, either on sea or land. The condenser in stationary pump-engines afforded no inconvenience on account of space; but when it became a question of applying steam to locomotion, the heaviness and the bulk of the condensing apparatus were found to present insurmountable difficulties. For engines adapted to this purpose must not only carry the coal necessary to keep up the fire, and the water to be heated into steam, but an enormous quantity of cold water destined to effect the condensation. Such an engine could not possibly lead to any result. Instead of drawing others, it would itself have required

to be dragged along. The necessity of subtracting the engine from this double load, and of economizing space, while increasing the force and rapidity of the piston-stroke, gave rise to engines at high pressure. In their construction, the vapour having performed its work, was allowed to escape into the atmosphere ; but both in the case of forcing the piston up as well as down, it had to surmount the resistance opposed to its motion by the pressure of the atmosphere, and just in proportion to its speed in overcoming this resistance was its efficiency increased. Leopold, some forty-five years before Watt, had talked about moving pistons by steam against the air by getting up a pressure of some 100 lb. to the square inch ; but Watt, up to the period of his death, retained the rooted prejudices of his predecessors against the use of steam of a high temperature, and Leopold's suggestion remained unproductive until an obscure Cornwall engineer saw in the formidable qualities which had excited the fears of his contemporaries those very properties which fitted the steam-engine to dwarf, by fresh triumphs, all the results it had previously achieved. What principally induced Trevethick to prefer steam of a high temperature, was the power it gave of dispensing with the use of the condenser altogether, which, from its cumbrousness and the difficulty of supplying it with water, made Newcomen's imperfect apparatus a preferable instrument for the propulsion either of vessels or waggons. It was very fortunate for Watt that, during the thirty years that his monopoly existed,

the whole ingenuity of man could devise nothing which might enable them either to substitute a better instrument in its place, or to do without it, and that, no sooner had his invention become public property, than Trevethick's invention raised up a competitor which in some measure threw it into the shade.

The first person to turn these improvements to account at sea was Fulton, who had, by Bridgewater's advice, given up the profession of painting for that of civil engineer. Having returned to America, after some stay at Birmingham to familiarize himself with the mechanical arts, he resolved to renew, with an engine of 20 horse-power, the attempt at steam navigation. He launched a boat of his own construction in the harbour of New York for Albany, in 1807, which proved a great success. The steamboat continued to make the voyage between those two towns with goods and passengers at the rate of eight miles an hour. She was described by those who had indistinctly seen her passing in the night as a monster moving on the waters, defying the winds and tide, and breathing flames and smoke. Using dry pine-wood for fuel, she emitted a column of ignited vapour many feet above the flue, and threw off, whenever the fire of the engine was stirred, a galaxy of sparks, whose brilliant appearance attracted the attention of the crews of distant vessels. When these saw her approach rapidly towards them against the force of wind and tide, and heard the noise of her machinery

and paddle-wheels, they in some instances shrank beneath their decks to avoid the terrific sight. Those near land quitted their vessels to go on shore ; whilst others, prostrating themselves, besought Providence to protect them from the approach of a monster which was marching on conflicting tides, and lighting its path by the fires which it vomited.

This triumph led to the construction of a steamer to ply between Carlisle and Glasgow, in 1812, and in the following year another was launched, to make the passage between Yarmouth and Norwich. The new power raised, as usual, a tempest of hostility. It was said the boats were liable to constant danger of being blown into splinters ; that they would be uninhabitable from the filth of smoke and grease ; that they were a wanton interference with the ways of Providence, who used the winds and the tides to govern the movements of men. The old packet companies evinced particular vindictiveness to a movement which threatened to annihilate their interests. The captain of the Yarmouth vessel was stoned in the streets. In the year 1814 Brunel made his first experiment on the Thames, with a double-acting marine steam-engine. Having accomplished his voyage to Margate, he wished to obtain accommodation for the night. But so strong was the prejudice which this new mode of communication excited in the minds of the inhabitants, that, blind to their future interests, they threatened personal injury to Brunel, and the landlord of the hotel absolutely refused to provide him

with a bed. To open the eyes of the Government to the advantages of introducing the new agent into the royal navy was a task of the greatest labour. Rennie knocked at the doors of the Admiralty for some time before he could get them to accord him the slightest attention. Naval officers conjectured, if they admitted the new power, the knowledge they had acquired of seamanship would go to the ground, and to become in any way efficient, they must learn their rudiments over again and become engineers. It was all very well for commercial packets on rivers, but if war vessels were loaded with these ponderous machines, in addition to gunshot and cannon, they would lie very much at the mercy of the waves; and what between the dangers of boiler explosions and the fury of the tempest, neither the ships nor the lives of those engaged in active service would be worth six months' purchase. But Rennie, in the teeth of this opposition, was importunate. At length Lord Melville allowed the Government engineer to employ a Margate steamboat as a tug for a 74-gun frigate from Woolwich to two miles below Gravesend, against a rising tide. The experiment, which came off in the middle of June, 1819, was eminently successful. The Government immediately authorized the construction of a steamboat at Woolwich, of similar dimensions, for the same purpose. But it was not for twenty years afterwards that Government introduced steam for the propulsion of ships of war; and no naval warfare, except the ignoble encounters with the Chinese and

with the granite walls of Sebastopol, is likely to test their efficiency before the navy will have to be taken to pieces again, and reconstructed upon an entirely different model. The pattern of that model was furnished to the Government some twelve years ago by its Anglo-Swedish inventor; but the Government, with its usual disregard of theory, paid no attention to the subject, until the recent struggle in the American seas opened their eyes to the necessity of its adoption.

These successful attempts to impel vessels at sea against the power of wind and tide encouraged the persistence in the contemporaneous struggle to establish steam-carriages. The first locomotive was constructed by Cugnot so early as 1769, but the inventor, not having any power over its movements, it ran against walls and destroyed property. The machine was, therefore, taken off the common roads, and locked up in the Government arsenal. Watt, in the specification of his patent for parallel motion (1784), described the mode of applying steam to wheel-carriages; but the rough sketch of his design did not appear very practicable, and the idea was abandoned.

The locomotive, in its broad essential features, may be said to have sprung, like Minerva, complete from the brain of one man. Had Trevethick paid only moderate attention to the embodiment of his high-pressure engine in the steam-carriages, no other agent would have been wanting to complete its final

triumph. A rotatory motion was communicated to the four wheels by the piston-rod acting in a horizontal position, and connected with them by a crank in the centre of the axles. The piston was projected forwards and backwards by steam, which at each rebound was drawn into the chimney and escaped into the atmosphere. Trevethick worked his locomotive on the high road. As the steam first escaped from apertures at each side of the engine, it gave his machine the appearance of a huge animal. Hence, the name of snorting dragons, which they got in the country, was not so great a misnomer as might appear. Trevethick brought his road-locomotive up to London for exhibition in Euston Square, where it dragged behind it wheel-carriages full of passengers. But on the second day, though immense crowds had collected to witness the performance, Trevethick, seized by some odd whim, shut up the place, and had the engine secretly taken away.

The inventor had, from the commencement, contemplated the adapting of his locomotive to the iron railway, and had a specification in the patent which he took out to that effect. He therefore, in 1804, constructed a second locomotive on an improved principle for this purpose. It was tried on the Merthyr and Tydvil railroad, where it drew as many carriages as carried nine tons of iron at the rate of five miles an hour. He even took out a patent for heating the surface of the boiler by means of small tubes, which, combined with the eduction of the chimney, would

have trebled the speed of the engine. But just on the eve of reaping all the benefit of his design, he turned away from his splendid creation like a child tired of its plaything, entirely indifferent to the grand vista of fame and fortune it opened out to him, and only anxious for something new. Is it Fate that impels some minds to shun, as zealously as others to court, and thereby achieve, success? Trevethick turning away from the locomotive at this critical juncture can only be paralleled by De Quincey turning away from Oxford, or Attila from Rome.

It happened, some years afterwards, that the Mexicans, labouring under great difficulties in pumping out the water which overflowed their mines, looked to English engineers for assistance. Uville, one of their agents, came over to England and interested Trevethick in the undertaking, who proceeded to construct five engines for the purpose, which Uville took back with him, with three Cornish miners, to Peru. The engines were shipped for Lima, and conveyed with great difficulty across the mountains to their destination. Trevethick himself set sail for the mines a short time after, with three engines more. He was greeted at Lima with a royal salute, and received with all the honours of a crown prince. The viceroy ordered a guard of honour to attend him, and proposed to erect his statue in massive silver. Uville wrote to the engineer's friends in England, and told them that his emoluments would extend over £100,000 per annum. But the next thing heard of

poor Trevethick is, that he is at Darien, making his way back to England, with neither shirt in his port-manteau nor sixpence in his purse. Yet he was full of splendid speculations, though a mendicant in means. He was begging his way back to England to organize a grand gold-mining company, which was to make the fortunes of thousands. With all his splendid genius, he died as poor, and in the same obscurity in which he had been born. Most people are the victims of Fate; Trevethick was the martyr. It was his to go through the labour, but the destiny of less-gifted men to reap the reward.

CHAPTER VI.

THE GOAL.

TREVETHICK'S invention was not allowed to die when abandoned by its parent. Railroads began to be much in request, and lines were not only laid down in colliery districts, but projected between some of the leading towns of the kingdom. Hence the attention of many was directed from a new highway to the nature of a new tractive power. It was conjectured that Trevethick's engine had failed to go so fast as it might, from the want of the wheels' adhesion to the rail. To remedy this supposed defect, Blenkinsop, on a colliery railway near Leeds, worked Trevethick's engine with a cogged wheel and rail, but without producing any improvement in its speed. Mr. Blacket tried Trevethick's engine upon another colliery rail at Wylam, and employed the rack-rail and toothed driving-wheel after Blenkinsop; but by some mismanagement the engine burst, and the locomotive shivered into fragments. Mr. Blacket then had an engine constructed at Wylam, which met with more success; but its pace was so slow, and the breaking of the cast-iron rail so frequent by the clamping of the wheel, that very little if anything was saved by the substitution of steam for the pur-

pose of traction instead of horse-power. Blacket then thought that the rack-rails and toothed wheels were a useless addition to Trevethick's engine, and had recourse to the following experiment to test it. Having constructed a frame of four wheels like the one on which his locomotive was mounted, he set a man to turn each wheel by a windlass, the workmen standing upon projections attached to the sides of the carriage, in such a relation to the windlass that their entire strength might be employed in working it. Mr. Blacket soon found that the carriage moved as fast as the wheels were turned, and that even if the weights were varied, there could be no slipping. This device itself simply exploded a prejudice, without establishing anything new; for though Trevethick's experiment on the Welsh railroad had been tried with the cogged wheel, the inventor had long been of opinion that the weight of the engine would produce sufficient adhesion to the rail to enable it to draw after it the requisite number of carriages in all sorts of weather. Notwithstanding, Mr. Blacket chronicled the result of his experiment as a great "find," and thought himself entitled to be registered as the principal creator of the working locomotive. But this honour was reserved for another.

Near to Blacket's works at Wylam were the collieries of Killingworth, at which George Stephenson was employed, first as breaksman, and afterwards as engine-wright. He had early opportunities of

observing Blacket's progress; for the tramroad along which the coals were hauled passed by the cottage in which Stephenson was born. Stephenson had early distinguished himself by improving the gear of fixed engines; for he loved their mechanism, and took great pleasure in familiarizing himself with all their details, whilst taking them to pieces for cleaning purposes. He failed not to pay periodical visits to Wylam, for the purpose of observing the working of Blacket's locomotives, and at length allured his employer, Lord Ravensworth, to allow him to construct a locomotive, and employ it for the haulage of coals at Killingworth. The engine was put on the Killingworth railroad in 1814, while Trevethick was preparing to start for Lima. The engine, which was constructed with smooth wheels, drew after it carriages containing thirty tons weight of coals at four miles an hour. But "Blucher," as the engine was called, proved a nuisance to the neighbourhood, as the steam was allowed to escape from the sides of the engine, to the terror of the cattle and the destruction of the quiet of the neighbourhood. It also, from the slowness of its tractive power, presented little if any advantage in point of economy over horse-power. Stephenson then proceeded to build another locomotive, with the view of adopting Trevethick's expedient of conveying the education steam into the chimney, which so much stimulated the draught from the fire as to increase the generation of steam, and with it the engine's power of traction. He also

added springs to the engine, simplified some of the old gear, and found that his combined improvements added two miles per hour to the speed of his first locomotive, and destroyed its jolting motion. This new engine, therefore, entirely superseded horse-power upon the Killingworth railway; and if the machinery presented few results which were not embodied in Trevethick's first locomotive, the Killingworth engine-wright had the great merit of introducing the discovery of steam locomotion as a permanent economic agent in the industrial machinery of the country, instead of using it, like its parent, as a raree show, which, after it had been the subject of nine days' wonder, was to be cast aside. Next to the man who invents a useful instrument, the praise is due to him who turns the invention to account, and shows how the discovery may be so perfected as to reap the greatest benefits for mankind.

George Stephenson's success at Killingworth early attracted the attention of colliery owners. He alone remained in the field when it was abandoned by all his rivals. Others might sneer at Trevethick's invention, but Stephenson evidently believed it to be the one great fact of his time, and clung to it as the only object worthy of his attention. His perseverance led others to share his belief in the economic advantages of the locomotive over horse-power. His services were called into request by the Hetton Coal Company, who employed him to lay down a railway near Durham for locomotive traction. Stephenson,

however, had faith in his engine only when employed along a level road, and as the nature of the country precluded the laying down of a flat line, Stephenson proposed to work the inclines by stationary engines, only using the locomotive when the road could be laid down perfectly level. He was also subsequently engaged by Mr. Pease to construct a railroad between Stockton and Darlington, which he likewise worked by means of fixed engines where any inclines threatened to interfere with the power of the locomotive. To prevent these constant breaks from fixed to locomotive engines interfering with the convenience of passengers, Stephenson had their trains drawn by horses. This early crotchet of his about gradients, which remained with him to the end, interfered with the first development of the railroad system, throwing many difficulties in the way, and hindering its advantages from becoming so patent as they eventually proved.

As the Manchester and Liverpool Railway was drawing near to its completion, it became a question as to the nature of the tractive power to be employed. The great expense incurred in the erection of the works rendered this subject of extreme importance. A deputation from the company inspected, with this view, the railroads in the northern parts of the country, who decided in favour of fixed engines, and against horse-power. Mr. Stephenson zealously advocated the employment of the locomotive. The company, embarrassed between conflicting reports and by the

numerous plans of all kinds which were showered in upon them by contractors from every part of the world, commissioned two eminent engineers, Messrs. Walker and Rastrick, to inspect all the English railways then in existence. These gentlemen, after an elaborate survey, considered stationary engines to be the most economical, and differed essentially from Mr. Stephenson in several very important items of expenditure. They coolly proposed, having divided the line between Liverpool and Manchester into nineteen stages of one mile and a half in length, to erect low-pressure engines at each, for the purpose of impelling the trains along by a complicated system of ropes, rollers, and pulleys. The report of these gentlemen was industriously circulated among the directors of the company, and might have been adopted had not Mr. Robert Stephenson and Mr. Locke stepped in at the critical moment, and shown the insanity of the project.* By reciprocating fixed engines dragging one train up by the same rope which was to pull another down, it was pointed out that a single accident would occasion a suspension of the traffic from one end of the line to the other; whereas, an accident by a locomotive would only extend to one train of carriages; that with fixed engines no branch lines could be introduced without changing the entire system; that with loco-

* Observations on the Comparative Merits of Locomotives and Fixed Engines, as applied to Railways; being a Reply to the Report of Mr. James Walker. By Robert Stephenson and Joseph Locke, Civil Engineers.

motives the number of engines could be adapted to the amount of traffic, but that with fixed engines, whether the traffic were large or small, the same amount of machinery would be constantly kept up; that the expense of fixed engines, supposing these adapted to the traffic, would be twice as great as locomotives, and the speed, on account of the frequent stoppages, not one-fourth so great; that the long chain of the connected power of the stationary engines, with the continual crossing of the trains from one line to the other, and subject to the government of 150 men, each of whose undivided attention would be conjointly requisite to prevent the stoppage of the whole line between two of the most important towns of the kingdom, was totally unfitted for a public railway. These arguments, which subsequently took the form of a pamphlet, decided the question in favour of the locomotive. The directors forthwith offered a prize of £500 for the best engine which should not weigh more than six tons, and draw after it three times its own weight at the rate of ten miles an hour. The trial was to come off at Rainhill, in the October of 1829. Mr. Wood, of Newcastle, in conjunction with Mr. Rastrick and Mr. Kennedy, of Manchester, were appointed judges.

The interest excited at the approach of the trial was something unparalleled even in the annals of the scientific world; for a combination of design was talked of which would double the ordinary speed of the engine worked by Stephenson upon the Killing-

worth Railway. Trevethick had patented an invention, so early as 1806, for increasing the heating surface of the boiler by enclosing in the interior small perpendicular tubes. Mr. James, a son of the first surveyor of the Liverpool and Manchester, constructed a model engine with a boiler of this description, and told Stephenson that, upon applying the multitubular boiler to his locomotive, there would be no limit to the speed of the engine. M. Seguin, engineer of the Lyons and St. Etienne Railway, turned this idea to account by immersing a series of tubes horizontally in the water of the boiler, through which the hot air passed in streamlets, greatly augmenting the heating surface, and consequently the evaporative power. Stephenson, who supplied Seguin with locomotives from his works at Newcastle, received instructions to construct two engines for the French engineer, with boilers on the multitubular principle which was expected to double the speed of the locomotive. Mr. Booth, the secretary of the Manchester and Liverpool line, suggested to Stephenson the propriety of embodying this principle in the engine he was preparing for the trial, and of making some experiments, in order to insure its successful application. Stephenson's rivals were no less bent upon availing themselves of this improvement, and astonishing results were anticipated from the attempt.

On the 6th of October, to which day the competition had been postponed to enable the engines to get into gear, the ground at Rainhill presented a most

animating appearance. Many thousands were collected from all parts of the country ; among whom were some of the first engineers of the day. A commodious tent had been erected for the accommodation of the ladies, which was graced by the beauty and fashion of the neighbourhood. The sides of the race-ground were lined with carriages of all descriptions, and exhibited as much bustle and excitement as if the great St. Leger had been about to be contested.* The two favourites were the "Rocket" of Stephenson, and the "Novelty" chiefly constructed by Ericsson, whose recent achievement in the American waters bids fair to revolutionize all the tactics of naval warfare.

The "Novelty" not being ready, the "Rocket" was first called out, and was attached to a load of $12\frac{3}{4}$ tons, making the total mass in motion 17 tons. The distance run at full speed was 12 miles, which was accomplished in 53' 20", being at the rate of $13\frac{1}{7}$ miles an hour. But this was merely a preparatory experiment. It was not till the 8th that the engine was summoned to go through its definite trial. The engine was taken to the weighing-machine, its fire-box filled with 142 lb. of coke, and the steam raised

* The card of the engines entered for the prize was as follows :—

| Names of Engines. | Owners. | Tons. | Cwt. |
|--------------------|----------------------------|-------|-----------------|
| The Novelty . . | Braithwaite and Ericsson . | 3 | 1 |
| The Rocket . . | G. Stephenson | 4 | 5 |
| The Sanspareil . | J. Hackworth | 4 | $15\frac{1}{2}$ |
| The Cycloped . . | J. Brandreth | 3 | 0 |
| The Perseverance . | S. Burstol | 2 | 17 |

until it lifted the safety-valve, loaded to a pressure of 50 lb. to the square inch. The engine then started upon its first experiment, dragging after it a load of waggons filled with stones to the amount of 13 tons, and made the first ten trips backwards and forwards upon the two miles of road in 1 hour and 48 minutes. In the second experiment 30 miles were travelled over in $2^{\circ} 6' 49''$, which is at the rate of $14\frac{2}{10}$ miles per hour, and the stoppages at the end amounted to $50' 20''$, during which time the engine travelled 5 miles. The average rate of speed of the "Rocket" was $15\frac{3}{4}$ per hour, and the maximum 24 miles per hour. The amount of coke consumed was 0.91 lb. per mile.

On the "Sanspareil" being called out, it was found that the engine with its complement of water weighed 4 tons $15\frac{1}{2}$ cwt. But by the conditions an engine of that weight ought to have been placed upon six wheels; and since the "Sanspareil" was on four, the judges considered it was not entitled to compete for the premium. The owner was, however, allowed to test its efficiency. But in the eighth trip, from want of a supply of water in the boiler, the leaden plug was melted, and the water and steam rushed into the chimney and put an end to the experiment. It had, however, so far accomplished its journey, at the rate of about 14 miles an hour. The consumption of coke was $2\frac{4}{10}$ lb. per mile. If its speed, therefore, had equalled that of the "Rocket," its quick combustion would have been fatal to its claims.

The "Novelty," which had been tried on the 10th, burst a pipe in the forcing-pump, which put an end to the experiment, not before it had gone at the average rate of 15 miles per hour. It was again brought out on the 14th, and performed the first trip of 3 miles in 16' 43", being at the rate of $10\frac{3}{4}$ per hour. But in the second trip the pipe which conveys the heated air from the furnace through the boiler collapsed, and the steam escaped from the bottom of the furnace into the atmosphere. Its owners then withdrew the engine from further competition. The "Perseverance" then succeeded, but could not get over the ground at greater speed than 6 miles per hour. Mr. Brandreth declined to make a trial of the "Cycloped." The course was thus left clear for the "Rocket," which, having gone through the ordeal and fulfilled every stipulated condition, was pronounced by all to be fully entitled to the prize; and to show that it had been working quite within its powers, Mr. Stephenson had it brought on the ground detached from all incumbrance, and in making two trips, it moved, to the marvel of all the spectators, at the rate of 35 miles an hour.

The works of the Manchester and Liverpool line were in some parts of a very heavy and expensive character. Stephenson, in order to avoid the opposition of powerful landowners, had been obliged to drive his railway over four miles of the boggy enclosure which goes by the name of Chat Moss, a swampy Syrtis that almost resembled that Serbonian bog in

Dalmatia, which had swallowed up whole armies. The feat was accomplished by sinking hurdles and making them the foundation of an immense embankment. This could only be effected at an enormous outlay of time and money. The tunnel, also, extending for upwards of a mile from Edgehill to Liverpool, was another enterprise which involved the company in much expenditure and some litigation. The company were, however, on the eve of meeting the reward of so much energy, enterprise, and skill. The opening of the line, first announced for the 1st of January, 1830, was postponed till the September of the same year. The Duke of Wellington, then Prime Minister; Sir Robert Peel, one of the Secretaries of State; and Mr. Huskisson, one of the members for Liverpool, and an earnest encourager of the project, even in its gloomiest days, were present on the occasion. Mr. Stephenson had constructed eight engines for the company, the whole of which were placed on the line and marshalled in procession, with flags flying, accompanied with carriages which contained bands of music and upwards of 800 distinguished persons. Thousands of spectators assembled and filled the air with loud plaudits as they beheld for the first time engines of such heavy weight dragging with marvellous speed carriages laden with passengers, up inclined planes, over arches spanning deep ravines and rivers, at a distance of 60 or 70 feet perpendicular height, and across undrained marshes or rocky acclivities where it had been hardly possible

before for man or beast to plant the sole of the foot. Those shouts were justly earned, for never was triumph more complete. The engines sped along over the heads of the spectators at the rate of 15 miles an hour, and this marvellous speed burst with all the effect of a divine phenomenon upon the world.

But the brightest day which scientific annals have to record was destined to have its gloom. As the engines and their carriages were being passed in review before ministers, Mr. Huskisson went on the line to speak with the Duke of Wellington, who, with his colleagues, occupied a carriage attached to the "Northumbrian," drawn up in state for the occasion. At the moment the "Rocket" came up, Mr. Huskisson, in attempting to get round the door into the carriage, came into contact with the engine, and, falling with his leg doubled across the rail, was instantly crushed. The unfortunate statesman died the same evening. This melancholy event put a stop to further festivity. A national fête at once assumed the appearance of a funeral procession. The visitors proceeded to Manchester, not without dark forebodings, and then dispersed.

The Manchester and Liverpool Railway, though its actual cost, £1,200,000, amounted to more than twice its early estimate (£510,000), realized £82,500 per annum, which was £20,000 more than the most sanguine of its projectors had, even in the cheeriest moments, been led to expect. The directors had estimated their principal profits from goods traffic,

relying little upon the transit of travellers. But the railway had scarcely been opened before it carried, on an average, about 600 passengers a day, and five years after the opening it carried nearly half a million a year. The efficiency of Stephenson's engine also rapidly increased. The "Planet" took the first load from Liverpool to Manchester on the 4th of December. The cargo comprised 200 barrels of flour, 100 sacks of malt and oatmeal, and 18 waggon-loads of cotton, and weighed, exclusive of the engine, 80 tons. Yet the total load was taken to Manchester, in front of an adverse wind, in the course of two hours. She had previously accomplished the same distance, with five carriage-loads of voters, in sixty minutes. On the 25th of the following February the "Sampson" drew a train of 30 waggons, weighing 151 tons, at the rate of 70 miles an hour on the level parts of the line. These results were also attended with a great economy of fuel, owing in part to a hint which Trevethick dropped in a brief interview Mr. Robert Stephenson had with the Cornwall engineer on his return from America. Trevethick urged the saving of caloric and fuel effected by enclosing the cylinders of pumping-engines in an engine-house. Mr. Stephenson, acting on this suggestion, enclosed the locomotive cylinder in the smoke box. During these startling triumphs, owing, in the main, to the teeming devices of his own brain, poor Trevethick was living in obscurity in a London garret, absorbed in bringing a machine to perfection which he had designed for the heating of rooms!

The success of the Manchester and Liverpool line had flooded the country with surveyors, who were reaping large fortunes by preparing to run railways through every gentleman's estate in Britain. Lines were projected between each of the large towns in the three kingdoms, and both contractors and engineers were about to realize millions by carrying them out. But Trevethick gazed on, totally unconcerned that he had sown the seeds of which others were preparing to reap the harvest.

CHAPTER VII.

THE GRAND JUNCTION RAILWAY—GEORGE STEPHENSON
AND JOSEPH LOCKE.

IT very rarely happens that the investigation of the differences of successful men affords anything more than gratification to vulgar, impertinent curiosity, and indulgence to the miserable jealousies and piques of their relative supporters. But when it does happen that the investigation will exemplify the action of conflicting principles, still more when it is the only means of tracing the successful application of right principles to a novel and necessary system, it should be made, with complete calmness and as much suppression of the personal conflict as is possible. There was, as is known to all the world, a serious difference, terminating in final rupture, between George Stephenson and Joseph Locke. That difference we shall narrate. If it be only rightly written and rightly read, it may instruct all and can offend none. Though bitterness of feeling may have arisen and continued between those implicated in the quarrel, it is an easy matter for us to feel most dispassionately. Indeed, it would be a difficult matter for us to feel otherwise. We can see clearly enough, at this distance of time, how the

opposition and divergence of these two men were a necessary result of the time, of their respective ages, education, and habits of thought. However trifling may have been some of the minutiae of the quarrel, the causes were of mental, the results of national importance. This will appear more clearly as the story is told. The story, at the same time, will unfold the life of Joseph Locke for more than five years.

A year before the expiration of the term of three years during which, as has been stated, Locke was to be Stephenson's pupil without paying premium and without receiving salary, Stephenson proposed a fresh arrangement. He wished to secure Locke's services for three years more, offering him a salary of £100 per annum. By the other assistants this offer was refused; by Locke it was accepted. What services he rendered have been related in the last chapter, in its treatment of the survey and construction of the Liverpool and Manchester Railway. But during this period two occurrences had taken place, which, though distinct from the causes of the eventual rupture, and though their non-occurrence would not have prevented it, throw some light upon its origin. When the pamphlet written by Robert Stephenson and Joseph Locke on the locomotive was passing through the press, George Stephenson urged that the title-page should bear his name, and his name only. Locke objected, but ultimately waived his objection so far as to permit the addition to their joint names of the words, "Compiled from the Reports of George

Stephenson." The concession was made, but, on Locke's part, with great reluctance; urging, as he did, that the experiments on which the pamphlet was based were made personally by Robert Stephenson and himself during a period of several weeks which they spent in the neighbourhood of Newcastle. All concerned, however, had the satisfaction of witnessing the triumph of the locomotive for which they fought.

During the construction of the Liverpool and Manchester line, Locke was deputed by his chief to make surveys of various lines of railway, of which the Manchester and Stockport was the most important. To this the directors of the Liverpool and Manchester objected, considering themselves entitled to his undivided services, and his absence detrimental to their interests. Stephenson replied that Locke was his assistant, that his presence on the Stockport line was absolutely necessary, and pledged his word that the interests of their line should suffer no injury. The directors, however, would not yield, urging that the line was close upon completion, that it would soon be opened, and that it therefore more than ever required the attention of the man who had had so much to do both with its survey and its construction. Stephenson was equally determined. Locke was the depositary of all the facts connected with the Stockport line; his presence on it was essential; his removal would be tantamount to its abandonment, or a delay in its completion unassignably remote.

He declared that he should withdraw Locke from the Liverpool and Manchester line altogether. The relative obligations of the persons interested were not so definite as they ought to have been; and as, in such instances, they have since become. The directors maintained that Stephenson could not withdraw him; and it raises the implication that Stephenson felt that he could not, since he induced him to resign. This resignation Locke sent in, well aware how requisite his attention was to the Stockport line, and desirous to prevent a quarrel between the chief whom he served and those who were only too anxious that he should serve them.

It was in 1830 that the first survey of the line from Liverpool to Birmingham was commenced. In this Locke was engaged. Other lines were being projected at the same time, which were laid out by him; but this was at the period his chief work, and with it is connected the turning-point of his career. In 1831 the bill came before Parliament. On the 22nd of April, Parliament was dissolved. On its resumption, the Liverpool and Birmingham Bill was withdrawn. The persons in the terminal towns who were interested in the scheme having agreed to unite their forces—hitherto divided, if not opposed—fresh surveys were undertaken, those at the Liverpool end being made by George Stephenson and Locke conjointly. Before the period, however, for depositing the bill arrived, the directors abandoned all idea of applying to Parliament that session. In the follow-

ing session application was duly made. The capital was to be £1,050,000. In the beginning of 1833, the bill of what was then called the Grand Junction was at last seen safe through both Houses.

After the resignation by Joseph Locke of his post on the Liverpool and Manchester line, another assistant was appointed by George Stephenson to succeed him. In this position, Locke's successor had to construct the tunnel which connects Edgehill with the station in Lime Street. After it had been laid out, it was asserted at the Board of Directors that serious errors existed, both in the levels and in the direction of the various portions on each side of the shaft. Locke had already acquired some fame, and no little confidence in himself and from others, in his construction of the tunnel to Wapping. It was therefore suggested by some of the directors that he should be asked to make an examination of the impugned plans, and report thereon to the Board. The suggestion was unanimously acceded to.

In obedience to their request, he made an investigation. The predictions made at the Board were verified : serious errors did exist. So serious, indeed, were they, that, had they not been discovered in time, the several portions of the tunnel would never have formed a straight line ; and in one instance, two parts of the tunnel, instead of meeting, would have given each other the go-by altogether. A report was written ; but before it was sent in, it was frankly submitted to the assistant engineer who had suc-

ceeded Locke, with full authority to make any alteration in it he chose, consistently with the facts themselves. He expressed himself perfectly satisfied with the way in which the facts were stated. The report was sent in, and was adopted by the Board. The new lines and levels of direction were to be those laid down by Locke, whose services they had objected to forego. His successor, however, continued the superintendence of the work; but the satisfactory completion of the tunnel proved the correctness of, and necessity for, the report.

Not only to the skilled engineers, but even to the unscientific public of to-day, it may appear astounding that the sections of a tunnel should be so erroneously planned, as that one section should absolutely cut past the other; but it should be remembered that railway surveying required the application of a science but little known to many, and absolutely unknown to some whose abilities in a cognate walk had allied with the early construction of railways. Nor should it be overlooked that the accurate use of delicate instruments, such as spirit-levels, theodolites, and miners' compasses, is not intuitively understood by any, and only mastered by a few. A man may possess rare abilities, may be indeed a surprising genius; but for lack of methodic tuition, or natural inaptitude in that particular direction, may show himself little better than a blunderer, if he attempts an exact survey. It is no disgrace to a man who, by the strength of his

own character, has succeeded in getting locomotives adopted upon tramways, to be obliged to allow that there are people in the world whom education has more fitted than himself for constructing a tunnel or surveying a mountain-range. If the envious and the superficial want to laugh at the mistakes of genius, let them read not only the works of Aristotle or Rousseau, but indulge their ridicule at the expense of Newton, Laplace, or Francis Bacon. For our part, we are no more astonished that the same man who taught Emile that "true self-love and social are the same," taught him also that "matter is the greatest of all abstractions,"—no more surprised that Newton, who, without involving himself in dogmatism about abstractions, demonstrated the law of gravitation, should deny the undulations of light; no more nor less surprised at all the shortcomings of genius which can be adduced, than we are at the discovery that one of George Stephenson's assistants should fall into error about a tunnel, and George Stephenson not correct it. The man who has once been right upon an important point when everybody else was wrong about it, can afford to be wrong in other matters very often. He need not dread the competition of his contemporaries. He will have to be wrong very often before he reduces himself to their level. We are so sorry, so grievously humbled in our human nature, when he who wrote the "Deserted Village" wants to stand on his head against a professed tumbler. But the dignity of

genius should take its stand a long way off so deplorable a catastrophe; and, content with the completeness of its beneficence within the limits of its authority, should not ambition the extension of those limits to the destruction of its sway. But, alas for the dignity of genius! It is secure only in the keeping of the philosopher; and with him, no further than the length of his pen. So a mistake was made or overlooked in a tunnel by an unquestioned man of genius, and corrected by an assistant. And in a celestial mind, we fear, brooded an irritation that was not soon to be dissipated; and in a mind hitherto dormant an awakening of conscious power, that was not likely long to play a subordinate part in schemes wherein his superior judgment had been so signally attested.

Hence, after the passing of the Grand Junction Bill, in 1833, when the appointments on the line came to be made, Locke was inclined to expect very much, and Stephenson was inclined to give very little. Locke had relinquished his position on the Liverpool and Manchester line in deference to Stephenson's wishes. He had taken charge of most of the surveys of the lines which had been intrusted to Stephenson from that period till the present. And from 1830, up to the existing juncture, he had particularly devoted his services to the Grand Junction, when he was regarded by everybody as George Stephenson's special representative. But he had prevented this unfortunate tunnel, to use Lord Castlereagh's

phrase, from "turning its back on itself;" and he was in high favour and repute with the Liverpool directors. Aware of their preference, and not at all disposed now to underrate his own just pretensions, Locke thought that the position of resident engineer should be willingly conceded to him. Stephenson declared it to be his intention to divide the line into three parts, and to offer this Liverpool, or northern portion, to a stranger. The directors refused their assent. Negotiations with a view to settle the differences of view between Stephenson and Locke were set on foot, and urged by individual directors, with little or no effect. At length, Locke declared that he should withdraw his pretensions, and relinquish his claim to any appointment whatever. This brought matters to a crisis. Stephenson had finally proposed that there should be three resident engineers, Locke being one of them; thus adhering to the old system of the Liverpool and Manchester. To this the directors again objected; and on the very day that Locke offered to withdraw, they took the initiative, appointed him resident engineer, having special charge of the northern portion of the line, but during Stephenson's absence, the superintendence of the whole. Another gentleman was, in the following December, appointed resident engineer of the Birmingham end, subject to the terms of Locke's appointment; Stephenson promising him that he would never by absence give cause for Locke's interference.

It might have been supposed and hoped that an

antagonism so deplorable was now effectually ended. But an antagonism far more real and deeply seated, more important because more impersonal, was soon to be developed. The works to be executed on the Grand Junction were works of unexampled magnitude, unexampled cost, and unexampled complexity. The outlay was to be enormous. It was perfectly clear that any errors in the distribution of that outlay would be enormous. Blunders might easily be made, and they would be gigantic blunders. The strictest accuracy in the calculation of cost, even of the minutest details, would alone, in so novel and so huge an undertaking, prevent their committal. Nothing would insure this accuracy but method. It was not only absolutely necessary that the engineer should have the most exact idea of the materials required for every yard of the line, and the proper price of those materials, but should also foresee and anticipate the requirements of construction before they actually arose. Nor was this all. It was not enough for him to have this idea himself; he must communicate it; he must let the contractors who had to tender for these works know as intimately what would be wanted, and what would be insisted on, as he himself knew. It was requisite that he should prepare, in one word, a specification. The word is common enough now in the railway vocabulary, since the fact is common; but it was no such common matter then. He not only urged that all contracts should be tendered for after distinct specification, but

that, in the then comparatively inexperienced state of contractors, and their comparatively limited means of obtaining capital, the contracts should be let in lengths not exceeding ten miles, and that there should be a minuter specification, including every atom of detail, for each length. This system George Stephenson opposed. This system the directors were determined should be carried out. These gentlemen could never have demonstrated the application of the locomotive to smooth rails; but they were among the first to see and accept the fact when it was demonstrated, and to find money for its employment. They had not originated any system by which the cost of laying out hundreds of miles of railway could be as accurately calculated as the cost of laying out a kitchen garden; but they were quick to see such a system when it was unfolded, and firm to maintain that it should be carried out. The world is more indebted than is commonly supposed to people of average understanding. They originate no new ideas; they leave this task to genius. But they carry a good many of them out, when genius, whose own ideas they have already accepted, would prevent the acceptance of any other. The initiative in progress is taken by genius; but not less by it is taken the initiative in opposition to progress. It is no less true than fortunate, that a majority of those who could initiate nothing invariably sides with the former. Were men of genius to unite their mental forces, we should probably soon

reach the goal towards which Progress points. But as their mental forces appear to be about equal and opposite, it requires a considerable preponderance of the inferior mental forces to act in the right direction for us to move forward at all. Men of genius would annihilate each other. It behoves men who make no claim to genius, to see that they do not. The Liverpool Board of Directors acted accordingly. They had done battle for Stephenson's idea of smooth rails; they were not going to do battle against Locke's notion of smooth contracts. They would have clogged wheels no more in the one case than in the other.

The whole of the Northern contracts—those under the special superintendence of Joseph Locke—were prepared, issued, tendered for, and let by the 25th day of September, 1834. The first contract of the Birmingham division, the division under the superintendence of the Birmingham resident engineer, assisted by the engineer-in-chief, though tendered for in September, was not let at the close of November. Imperfections in the specifications and drawings prevented contractors from fully understanding the nature of the work required. One tender alone was received; and this contained several queries which went far to invalidate it. Tenders for other sections of the Birmingham division were ridiculously above the estimates of the engineers, and above what they would have been had the engineer drawn up a specification which properly represented to the contractor what he really had to contract for.

Under these circumstances, the directors saw no other course open to them than to apply to Locke. There were no material discrepancies between his calculation as to what would be the cost of the several lengths and the calculations made quite independently by contractors, as to the price at which it was worth their while to tender for their construction. The discrepancies between the calculations made jointly by George Stephenson and his assistant, and those made by the tendering contractors, were in some instances enormous. The discrepancies in the one instance, when taken into consideration with the absence of discrepancies in the other, could be accounted for only on the supposition that the specifications were exact and intelligible in the second case, inexact and unintelligible in the first. The justness of this supposition they resolved to test. They ordered Locke to prepare fresh specifications for those portions of the Birmingham division in which the discrepancies occurred. These instructions he complied with. The discrepancies between the calculations of engineer and contractor disappeared, and the works were let. One instance will justify both the directors and their engineer of the Liverpool division. The Penkridge viaduct, tendered for under the original specification, was estimated by the contractor at £26,000. When Locke had revised the specification, the very same contractor tendered for it at £6,000, and made by it a considerable profit.

The Board now clearly perceived, what they had

long suspected, that Mr. Stephenson's powers, splendid as they were when exercised within their special compass, were unequal to the new part which he was called upon to perform. The systematic organization of a public work where every part has to be foreseen and described, was alien to the mind which regarded discipline and method as trammels to fetter its free action, and could not be brought home to it late in a life whose early experience had not been tempered by rigorous education. Striking success in one direction makes men even of discreet cultivation impatient of tuition in another. Where this wise cultivation is altogether wanting, contradiction is generally regarded as an injury. The directors, fully impressed with what was due to George Stephenson, but not forgetful of the interests of their vast undertaking, and of the shareholders whom they had induced to embark their capital therein, were desirous to make an arrangement which they knew would satisfy their obligations to these last, and which they hoped would satisfy the merits and the sensitiveness of the first. With this view, at the close of the year, they appointed George Stephenson and Joseph Locke joint engineers. But they must surely have had misgivings as to the likelihood of the success of their arrangement. It did not succeed at all. In August, 1835, Joseph Locke was appointed engineer-in-chief, and George Stephenson withdrew from the Grand Junction Railway.

The antagonism could not possibly have termi-

nated in any other result. A biographer always believes that honourable motives actuated the man whose life he writes. Thinking otherwise, he should not write his biography at all. But a wise biographer will always, wherever it is not impossible, make concession of honourable motives to those who opposed the subject of his story. His task is then simplified into narrating what occurred, and resolving whether the occurrences were beneficial or otherwise. We have related with some hesitation the conflict, which we believe to have been unavoidable, between George Stephenson and Joseph Locke. We declare, without any hesitation, that the upshot of the conflict was absolutely unavoidable. Both meant well. Only one was right, and the other was wrong; and it would be absurd affectation to pretend compromise when compromise is unnecessary. The public could not have afforded that Stephenson should come off victorious in a battle wherein he was altogether mistaken. It was indispensable to the railway world that the difference should be settled in Locke's favour; and a moment's consideration shows that the railway world means the world generally. For if the railway world was not satisfied that railways would pay, the rest of the world would not have yet got railways at all. That this is no extravagant assertion will appear clearly enough, when we come to treat of their introduction into France, when companies organized for the purpose of executing railways, now highly remunerative, desisted from

their task, and prayed to be wound up, because people had not sufficient confidence in their remunerative character to advance the requisite capital. Railways were going through the ordeal of their introduction in England. It had been proved that they could be made: it remained yet to be proved that they could be made profitable. Once let it be suspected that they would prove a losing investment, for the present they would have been doomed. The only means that the public as yet could have of forming an opinion were afforded by the estimates of their engineers as to the cost of their construction.

If it be granted that nobody in England knew anything—and it is perfectly clear that their projectors knew nothing—about the traffic which would ultimately occur on railways, it was all the more necessary that there should be somebody who knew to a fraction what would be their cost, and somebody in whom, on that particular question, everybody else had reason to place implicit confidence. It was well for railways that there was such a person; and that person was Joseph Locke. It is idle to answer, as ingenuity might be tempted to answer, that had engineers estimated the cost of their works at the full value, whilst the public were estimating the receipts considerably below their full value, capitalists would have been terrified and would have refused their money, and that railways therefore owe their existence to the blunders of their projectors. Not to dwell upon this doubtful compliment to engineers, it may be said at

once that Joseph Locke not only estimated the cost of the Grand Junction up to its full value, but that the public found the money and received in return 14 per cent. for their confidence; and further, that the contractors, instead of being "overwhelmed, taking to their bed, and dying," as Mr. Smiles relates in the case of the London and Birmingham, made a handsome addition to their capital, which they were thus enabled to employ in future railway undertakings. It was a commercial question, and a commercial question only. Every other question had been settled. The report drawn up by Locke and Robert Stephenson had demonstrated theoretically the superiority of the locomotive. The trial of the "Rocket" had practically proved it. One problem was yet unsolved. That problem was, could railways pay? The solution depended on the relation between their cost and their traffic. Both were calculated. The first had in two leading instances turned out deplorably wrong; there was as yet no reason to suspect that there was any inaccuracy in the second. Locke came to the rescue. When the Grand Junction at once solved the question as to whether engineers could make correct estimates, by the light of which contractors could be induced to make tenders such as would leave their employers, the public, sufficiently remunerated for their payment, the railway question was settled.

Then it was, no doubt, that railways were made which ought never to have been commenced; and

disasters ensued which ought to have been foreseen. But for these who were responsible? Surely they, if any, who had led the public to conclude that enormous traffic would compensate for enormous blunders, and that unimagined returns would satisfy unimagined expenditure. Anybody seemed to think that he was justified in making a railway, when their projectors could not estimate the cost, and nobody could estimate the receipts. To be ignorant was no bar, to be sanguine was every recommendation, to public confidence. To be as ill-informed as everybody else, and to make everybody else as credulous as themselves, were the introductions equally of a chairman and an engineer. Had not men of the highest reputation committed tremendous errors, and were not their lines paying? Had not their expenditure doubled their estimate, and yet, was there not a dividend? Had no railways succeeded but after correct estimates, no railways would have been made but on correct estimates. But when one or two railways had succeeded after most erroneously small estimates, the conclusion came to be formed that no estimates could be too large, or that no estimates were required at all. Hence arose that railway mania, followed by a railway crash, which has been more than once most faithfully described, but which, we venture to think, has never before been attributed to its right cause. Had the engineers referred to, committed no blunders, or had their blunders been followed by proportionate failure, all would have been

right. It was one thing to make a railway pay when its engineer had distinctly told its directors what it would really cost, and quite another thing to make one pay when its engineer told its directors that it would cost much less than it actually did. Only professional men, men of science, could perform the former feat; the second was in the grasp of any charlatan; and charlatans were not very long in offering their services. These were accepted; they had their day. The crisis came, and the bubble burst. Science had played capital a very ugly turn; and capital is not likely soon to forget it.

In this ugly turn Mr. Locke had taken no part. He had not misled capitalists. This feat was performed by those whose successes had prevented his still greater, but more logical and legitimate success, from guarding them against being misled still further. All that he could do was to hold aloof from such hazardous enterprises, and obtain still further confidence by the application of his accuracy to enterprises more sober. The result of course was, that when the hollowness of those was finally displayed, these maintained their natural firmness.

In the mean time, skilled engineers sprang up, guided by the success of his method, and warned by the catastrophe attending its neglect. Those who, though most gifted and honourable men, had neither natural bent nor supplementary education to enable them to systematize the whole of railway operations, by reducing to a minimum the incidental contin-

gencies, equally with those who were neither honourable nor gifted in anything but assurance, were forced to quit the stage in favour of the class who had fitted themselves for the new order of things. Most of them slunk away from it, only too happy to escape behind the side-scenes, from a storm of execration. But there was one who quitted it with something like dignity, amidst the sympathizing and loudly-expressed approbation of everybody. That was George Stephenson. As has been told by his biographer, he publicly intimated at Blackburn, in 1840, that it was his intention to retire from the active pursuit of his profession. Who shall be so ungenerous as to blame, if a very pardonable self-love prevented him quite from seeing, or his biographer, if an equally pardonable tenderness prevented him from pointing out, that this retirement was necessary. There can be no question that it was. He was at Blackburn merely saying good-bye to people who had already extended him the courteous hand of farewell. He had played his part; and a right important one it had been. But it was played out. He had been gifted with immense force. All that force had been expended, and expended most usefully. Withal it was spent; and if he remained longer, he would be not a force, but an obstruction. To such complexion must the most vigorous come at last. The agitation that once produced orderly evolution would only now produce disorderly dissolution. Happy they who apprehend and cheerfully accept

this truth, and who realize in its adoption the complete justification and beautiful significance of death !

It is to be regretted that, after this formal farewell to railway pursuits, George Stephenson should have been induced, in an evil moment, to return to them. Unfortunately, he was introduced to George Hudson ; and still more unfortunately, Faust was not inattentive to Mephistopheles. Their names figured in the same undertakings. Hudson, as chairman of various railways, proposed and carried a resolution to erect a statue of Mr. Stephenson on the High Level Bridge, at Newcastle. The statue was never erected ; and another statue, too long prominent, was very shortly after pulled down. Mr. Stephenson then saw the error he had committed in having permitted himself to be again drawn into railway affairs ; and for the remainder of his life found more congenial, and probably more pleasant occupation, in attending to his collieries and lime-works, and vying with his neighbours at Tapton in the sensible ambition of agricultural pursuits. There, as elsewhere, he was revered as a great genius and benefactor of his species. And as long as great names are gratefully remembered in England, by England his name will not be forgotten.

Mr. Locke's position was now definitely established. He was the favourite engineer of mercantile men, of *bond fide* shareholders, not the pet of speculating chairmen and their temporary dupes. He was the practical engineer, who offered to make honest work

and honest investments remunerative to everybody, but had no philosopher's stone for anybody. The country had gone mad, and he had remained sane. He had made no man's fortune ; but then neither had he destroyed any man's fortune. With the Railway King he had had no connection, either social or shareholding. He knew all along what would be the end of such an empire as that. So that when the tumble came, and the monarch became an exile, it cost him very little to avow that "the man was more sinned against than sinning." Almost the only person entitled to cast a stone, he was the only one who held his hand. He had been neither a partner nor a dupe ; so could still afford to be a calm spectator.

Before we quit the Grand Junction Railway, we may state that it was during his engagement upon it that Mr. Locke turned his attention to the mode of fastening rails, and to the wooden key, as well as to improving the form of the rail itself. On the Manchester and Liverpool line the cope rail was wider than the under surface. The Grand Junction was the first in which the rails were equal in form at top and bottom.

The Grand Junction no longer retains its original name. But under whatever title, it must ever remain indissolubly connected with that reputation for firmness of will, integrity of purpose, ingenuity of resource, and skill in appliances, which Mr. Locke acquired during its construction, and carried with him, whithersoever he went, as the very shadow of his presence.

CHAPTER VIII.

MARRIAGE.

HOW thorough was Locke's devotion to the important undertakings on which he was engaged, and how great his anxiety that the Grand Junction should have the full advantage of his energies, may be inferred from a letter written by him in the autumn of 1833, just at the time when the last compromise between him and George Stephenson had been effected by the Liverpool directors. "I wish," he urges, "to have all my private affairs settled, in order that my mind may be disengaged for the great work I am about to undertake." In these simple but solemn words, he again displays that instinct for concentration which was, perhaps, the most marked feature of his character, and the preponderating cause of his success.

There is, however, one private affair which will intrude even at the busiest moments, and in spite of the most severe resolves, and refuse to be settled except upon its own terms. We do not expect to find in the career of one so soundly constituted as Joseph Locke what so many biographers have to relate, that he fell in love long before love could culminate in union, and was consequently crossed in

his devotion. His practical mind and constant occupation saved him from being enrolled in the sad though interesting martyrology of affection. But as little do we expect to find that a heart so warm as his remained unaffected, when once his means justified him in enlarging its freedom. Hence, when we have read in the same letter from which we have just quoted, "The directors have given me a salary of £800 a year, besides about £200 for expenses; this is beyond my expectations in every way," we are not surprised to hear that in the following year he married.

His wife was the daughter of Mr. John M'Creery, a printer, when printing was a very different occupation from what it has since become. Of this change he himself, writing in 1825, loudly complains in his preface to the second part of his poem, "The Press." "Within a few years," he writes, "an entire revolution has taken place in our art, which is now becoming what, in more humble language, may be denominated a trade. One species of competition is fast hurrying it on to degradation—the competition in cheapness, or the discovery of a method of being able to labour without remuneration. This race of ruin has nearly supplanted that noble emulation which would tend to maintain the honourable rank of the printer, and which once stimulated several of its professors, some of whom have retired from their labours, whilst others have fallen from their high state, and sunk to the common level. Witnessing these changes,

I have not been backward in expressing the feelings that such events must naturally excite."

It needs but a slight acquaintance with the "Collection of British Poets," to discover that John M'Creery was as well entitled to a place as a good many who have obtained it. But he wrote at an unfortunate time. Darwin and Hayley published at a time when, though verse was in fashion, people were obliged to take what they could get. But in M'Creery's day there was a fair number of second-rate poets, and along with these were two of the very first order,—Shelley and Byron. To the first the public would not listen, and is not sufficiently understanding to listen yet. But to Byron they would give ear, and almost exclusive ear. The rest struggled on: Moore alone successfully. Campbell complained to Washington Irving that he had not a chance. Byron was flinging off poem after poem whilst he was labouring at one. And just as it came out, another appeared from the same prolific brain, and his production was shovelled aside. Rogers was a rich banker, had a fine house, entertained artists who illustrated, and writers who puffed his verse, and so got a footing. But we look in vain through his rhyming pentameters for anything better than the best passages of M'Creery. Indeed he was a most accomplished man. His poem on "The Press" affords frequent, nay, almost constant, demonstrations of this. He says, modestly, that "it is not exhibited as the offspring of academic study or uninterrupted

leisure ; but is intended chiefly for the purpose which the title-page has already sufficiently expressed ;” the title-page containing the notification, “ Published as a specimen of typography.” It was printed at his own press, but displays his mental no less than his mechanical ability. But, more than all, it manifests a mind generous in every particular ; loving freedom when freedom was not in vogue, hating opponents of progress when progress was a by-word. Some of the most excellent, and certainly the most touching, lines in the volume, regard the domestic affections. And the tone in which mention is made, in one place, of his mother, in another of his wife, and in another of his young daughter, gives glimpses of a man as unaffected in his sentiments as he was earnest in his conduct. This young daughter Joseph Locke eventually married, finding her what her father had prayed she might be :—

“ With gentle soul and heart sincere,
And only to herself severe.”

He seems to have been as fortunate in the time as in the object of his choice. Whether it were that success had caused him momentarily to relax his previous efforts, or that the opposition which he met with from his chief had somewhat disenchanted and disgusted him, certain it is that a most intimate friend and acute observer noticed about this period symptoms of slackened energy. Those symptoms the same authority declares to have disappeared on

the event of his marriage. He had fortunately become united with one who was as prompt in spurring his ambition as in solacing his fatigue. It has been her sorrow to survive him. And unable to imitate him in any other particular, she imitates him in the exercise of that benevolence, the obligations of which her husband, in the busiest part of his career, never overlooked.

It is here, perhaps, that we may most fitly narrate what Joseph Locke was always so proud and happy to recall; that on the Stockport line was first formed that friendship with J. E. Errington, which ripened through life. It is sad enough for us to have further to narrate that so distinguished an ornament of his profession fast followed in death the friend by whom he ever stood in life. With this faithful adjutant at his side, he proceeded with increased alacrity on his career, selecting out of the multitude of overtures made to him those lines which aimed at connecting distant capitals, or at bringing the sea to the gates of large inland towns, rather than any pet schemes, which promised to be more lucrative to the proprietary than beneficial to the country; being fully assured there was a solidarity of interests between himself and the public, and that, though a Minister might occasionally grow sleek upon the ruin, the engineer had no chance of rising except with the prosperity of his country.

CHAPTER IX.

ENGLISH RAILWAYS.

A LINE had been projected between London and Southampton so early as 1834, of which Mr. Giles was appointed engineer. The cost of the railroad was estimated at £1,200,000, and a dividend promised of 12 per cent. upon the outlay. But matters did not progress very satisfactorily at the outset, and Mr. Giles resigned. When Mr. Locke was appointed to succeed him, the shares immediately rose in value, and became very much sought after; for the monied world early began to find out that he would connect himself with nothing not likely to realize a handsome dividend: nor were its anticipations in this case unsupported by a powerful array of facts. The value of the gross trade between Liverpool and Manchester was taken at £183,306; that between London and Southampton at £190,000. More coaches were proved to run upon that route than formerly had run between Liverpool and Manchester, and more goods waggons than between London and Birmingham. Then there were the Torbay fisheries, the produce of which was often found rotting in Southampton for want of a speedy communication with London; and the merchant vessels, which, in-

stead of discharging their cargoes at an opportune harbour, were obliged to pass round the North Foreland, and proceed at a snail's pace up the blockaded Thames. By a railway from Southampton their freights would reach town in five hours, while the transit up the river, even with a clear passage, would take up twenty-eight hours. Portsmouth harbour was already impeded by mercantile vessels, which, in the event of a railroad, would make for the much more convenient port of Southampton. Then there were the troops from Winchester, who would use the railroad to embark at Southampton in preference to any other port. There were, too, all the argosies of the Indies, the owners of which, in the event of a convenient port in Southampton river, would make use of the railway for the conveyance to London of the jewels of Delhi and the silks of Cashmere. Yet, notwithstanding these inducements, the shares were not quickly taken up. Owing to financial difficulties, the line was not completed to Basingstoke before 1839, and to Southampton for a year and a half afterwards. The principal labour on the line were steep cuttings and embankments. Upwards of 16,000,000 cubic yards of earth had to be removed; for Mr. Locke disliked tunnels, and had recourse to them only when no other means could attain his object; for steam, operating upon an imprisoned atmosphere, generated much carbonic acid gas, which was not particularly calculated to improve the health of the passengers. In this respect he was also in anta-

gonism with George Stephenson, who avowed, in an examination before the House of Lords, that he saw no objection to a tunnel twenty miles in length.

When the London and Southampton line was about half completed, Mr. Locke was appointed engineer to the line between Sheffield and Manchester, comprising a distance of forty-two miles. The railroad had been projected some years before, but, owing to the heaviness of the works, had been laid aside. There was a tunnel to be made at Woodhead some three miles in length, the summit of that place being 1,500 feet above the Manchester level. The mountainous ridge which the tunnel perforates is called the back-bone of England, being a portion of the central mountain-line which divides the country. The tunnel is 20 feet high and 15 feet wide. The maximum depth below the surface is 600 feet, the average depth 450 feet. Mr. Vignoles, the first engineer, estimated the cost at £98,467. Mr. Locke, upon succeeding that gentleman, at once doubled the amount; for in the original estimate the cost of arching the tunnel with brick and masonry was not included, and Mr. Locke deemed this work essential to the durability of the undertaking.

Lord Wharncliffe turned up the first spadeful of earth 1st October, 1838, but the tunnel was not completed for six years afterwards, though eight hundred men were, upon an average, employed upon it. The works were carried on unremittingly night and day. Sunday, instead of being a day of rest for the workmen, generally turned out the busiest in the week.

The men were paid every two months, to preclude their indulgence in hebdomadal excesses. The difficulties of getting provisions to the place proved almost as great as victualling Balaklava. There was no town of any description for ten miles off, and provisions having to be dragged up a steep acclivity, could not be sold for any price which the navvies could afford to pay. The contractors had to open shops of their own, and pay their men partly in food. There were also no lodgings to be had in the farm-houses near, and the men were obliged to bivouac in huts run up with loose stones and mud, and thatched with ling from the moors, and sleep upon truckle-beds in groups of twenty together. They were visited by dissenting ministers, who preached to them in rainy weather under tarpauling canvas, and who appeared more zealous in proportion as their eyes were opened to the utter hopelessness of their mission. The men organized sick clubs, and had a surgeon to attend them, whose services were far more in request than those of his clerical colleagues; for in addition to private diseases, the number of casualties were something so alarming as to lead to a parliamentary inquiry. Twenty-eight men were killed. There were two hundred severe accidents, absolutely maiming their victims for life, and four hundred and fifty accidents of a minor character. But most of these casualties, and the confusion incident to the earlier part of the undertaking, sprung from the short system of contracts, of which Mr. Locke was the

determined enemy, now that a larger system had become possible. The first engineer leased out the work in small fragments to irresponsible and fragmentary contractors. Immediately after Mr. Locke superseded him, the whole work was placed in the hands of Mr. Nicholas Wood; order was at once substituted for chaos; the works went on with redoubled vigour; labour was economized, and life saved.

Mr. Locke, in his examination before the Lords' committee on the Southampton Railway, contrasted the two systems of contracts in a marked way, which put the remarkable discrepancies between them in their fullest light. With the small contractor there was no bond or security. He offered to make a cutting or embankment for so much per cubic yard. On getting the easiest half of it done, he was accustomed to decline going further without an extra price. The company having no bond for the performance of the work, were, in that case, obliged to yield to his exactions, or have the completion of the work indefinitely delayed by being transferred to an agent likely to prove as unprincipled as his predecessor; whereas the large contractor gave a guarantee of ten per cent. for the completion of his work, and engaged to keep his works in repair for a twelvemonth after completion; so that it became his interest to avoid scamping, and to make the work as perfect and complete as possible. In the case of the private contractor, the company found everything, the contractor nothing, and those articles which the company provided, upon coming out of the

contractor's hand, were proved to be nearly valueless. On the Liverpool and Manchester line the company expended £70,000 upon the purchase of waggons for the contractors alone. Those waggons were not afterwards worth £6,000 to the company. Occasionally the private contractor bolted with the money he got to pay the men. On account of the wasteful expenditure incurred by this hand-to-mouth system, the Manchester and Liverpool line cost upwards of a million, while it need not have cost more than half the money. Owing to these sad experiences, Mr. Locke decided to let all his works to large contractors by open tender; and, influenced by his recommendations, the directors of the Grand Junction and of the Sheffield and Manchester unanimously determined that no work should be done by private contractors, but that a bond should be taken from every person employed. It was a constant principle upon which Mr. Locke subsequently acted, to test the accuracy of his estimates and save the shareholders from the delusions practised on other lines, by getting responsible contractors to undertake the work under the cost and the time named in the specifications, and to guarantee its execution by depositing with the directors 10 per cent. of the capital at stake, which they agreed to forfeit in case of violating their engagement.

There were other works upon the Sheffield line besides the tunnel of an expensive character. A viaduct of five arches which crosses the river Tame

exhibits the appearance of a firm and substantial piece of masonry. The viaduct of Gorley consists of nine arches, one of which traverses at great height the Northam and Hyde turnpike. But the most beautiful and lofty structure on the line is the Eterow viaduct, 500 feet in length, which crosses the Mersey at a height of 136 feet, which is more than 10 feet higher than the viaduct which conducts the Manchester and Birmingham engines over Stockport, and about 14 feet higher than the celebrated chain-pier over the Menai Straits. The quantity of stone used in its construction would form a block of 186,000 cubic feet. The timber alone amounted to 41,000 cubic feet, which was brought from the Baltic, and immersed in a solution of sulphate of copper, that it might set time and the elements at defiance.

Notwithstanding the expensive character of these works, Mr. Locke volunteered to bring the cost of construction under £25,000 per mile, and got contractors to undertake the railway upon that basis, and deposit the usual securities for their execution under the conditions named in the contract. Though Leeds is the same distance as Sheffield from Manchester, he pledged himself to execute his railway at one-half of the price which the other had cost, and kept his word.

A railroad was early projected between Preston and Lancaster, a distance of some twenty-one miles. Mr. Locke was appointed engineer from the outset; for people had been impressed by the accuracy of his

judgment in the Grand Junction estimates, and the careful execution which the works of that railroad exhibited. His estimate, however, on the Preston line was interfered with by the Government requiring the height of the bridges to be increased and their bases widened, and by the exorbitant price the company had been obliged to pay for land. This item, which at first had been set down at £25,000, amounted to £90,000 ; in this manner the original estimates, first placed at £250,000, swelled to £400,000. Yet the Preston line, with all these drawbacks, only cost £20,000 per mile, while the Dublin and Kingston cost £50,000 per mile ; the North Union £30,000, and the London and Birmingham £46,000 per mile. The Preston is the cheapest line both as regards annual outlay and original cost of construction in the country ; for even the Grand Junction, which was at that time thought a model of economy, cost £25,000 per mile.

While the Preston and Lancaster was in course of construction, Mr. Locke projected the continuance of the line from Lancaster through Penrith to Carlisle, as part of a Grand Trunk railway, which, through the Caledonian, was to unite the two capitals of England and Scotland. It was an important scheme, skilfully planned and vigorously carried out. From Lancaster to Carlisle, as upon the Caledonian, there was a rival scheme, supported by great talent and interest in the country and in the House of Commons. Added to the strife of landowners and engineers,

there was the war of pamphlets, the war of newspapers, and the war of cities. Each party cried up its own scheme with as much uproar and persistency as if the fate of the universe depended upon its success. There were engineering niceties mixed up in the contention. The line by Penrith had to pass over Shap Fell, which overlooks an eminence of 600 feet. The rival line, fringing the coast, had not to encounter a greater rise than 90 feet; but it was thirty miles more in length, and twelve miles of it passed over Morecamb Bay and the Duddon Estuary upon an embankment reared upon land reclaimed from the sea. The advocates of the Coast line averred that the Shap Fell summit could not be ascended by any locomotive of average power; that the trains upon that part of the line would be continually embedded in snow during the winter. The advocates of the Penrith line as roundly asserted that no embankment could be run across Morecamb Bay, that could withstand the abrasion of a three months' wintry sea; that the action of the Atlantic upon that coast would of itself be sufficient to overturn any mound that man could raise; and that the Atlantic was at this point driven on by the waves of the Irish Sea, and lashed into fury by western gales during three-fourths of the year. The advocates of the Coast line replied that the expense of cuttings and embankments on the Penrith line would bankrupt the treasury; while the value of the land which the Coast line could reclaim from the sea would suffice

to liquidate the greater part of its expenses. The advocates of the Penrith line averred that their cuttings would be a flea-bite in comparison to the expense of their rival's embankment, which they estimated at three-quarters of a million, and that the sandy beach would not be worth a farthing an acre. The advocates of the Morecamb line expatiated upon the beauty of their scenery as an allurement to tourists. Their opponents enlarged upon the directness of their line as a convenience to merchants. Even women were exploited upon the occasion. It was asserted that the towns on the coast possessed higher samples of female beauty than the towns on the more direct route, and inferred from thence a lucrative source of income from the visits of prodigal bachelors, who would make use of the railway to hunt up the quarters of their Delias and Sacheressas. The dispute of the cities for the remains of Homer was nothing in comparison with the dispute as to which towns should become the stations of an iron highway between the commercial and political capitals of England and Scotland. When Venus was brought into the field, it was felt that the position was desperate, and Mr. Locke charged home with reasons of a more practical character.

If ninety miles could be made with as little cost as sixty, no one could maintain that ninety miles would be kept in repair for the same cost as sixty; as little could any one expect to travel over that increased distance without a proportionate loss both

of money and time. Induced by these reasons, which had been corroborated by some experiments Dr. Lardner had recently made on the Grand Junction, Parliament decided in favour of the line over Shap Fell. In fact, it could hardly have done otherwise. The general interests of the public required a prompt delivery of the mails, and it is evident that only by the most direct route to Scotland could that delivery be secured. The bags are forwarded by this line in connection with the Caledonian, as Mr. Locke predicted; but its construction did not hinder the rival line from being executed after a few years, as the growing necessities of commerce promised a fair remuneration for the capital invested. The embankment was therefore run by Whitehaven over Morecambe Bay, and the locomotive pursues its watery track unmolested either by the fury of Æolus or the tempests of Neptune. Perhaps no two lines of railway ever were constructed which more strikingly illustrate the daring assurance of man. Over Shap Fell the locomotive speeds with the rapidity of an arrow, arousing the bittern from its solitude, at a height which the eagle once claimed for its eyrie; while its rival proceeds along a strait dug out of the ocean, spurning the waves with all the majesty of a sea-bird!

It was Mr. Locke's fate to rouse the ire of the Laureate Wordsworth, by the projection of a railroad between Kendal and Windermere. While surveying the line in 1844, he, with his assistants, came in contact with the poet, and roused him from his solitary

musings. Though railroads had enjoyed for fourteen years an uninterrupted series of triumphs, Wordsworth, dreaming in Grasmere, had not yet awoke to a sense of their importance. The French Revolution ever gravelled him, and the idea of progress still wore a revolutionary air. Any attempt to make the world move faster than of yore was flat treason to humanity. The instincts of poets have seldom harmonized with mechanical inventions. Dr. Johnson complained loudly of canals in his day interfering with rustic privacy, and making living dear where it used to be cheap. But in the present case the engineer was preparing to invade the poet's quiet, and his political opinions, as well as his love of solitude, added intensity to the revulsion of his poetic instincts. He had come down to Windermere at great personal inconvenience to avoid noise. Why should turbulence follow him, and commerce threaten to drive a waggon-way through his hermitage? With some feelings of this sort, Wordsworth went home and gave vent to his wrath in the following sonnet:—

ON THE PROJECTED KENDAL AND WINDERMERE
RAILWAY.

Is there no nook of English ground secure
From rash assault ; * schemes of retirement sown
In youth, and 'mid the busy world kept pure,
As when their earliest flowers of hope were blown,
Must perish ; how can they this blight endure ?

* The degree and kind of attachment which many of the yeomanry feel to their small inheritances can scarcely be overrated. Near the

And must he, too, the ruthless change bemoan
 Who scorns a false utilitarian line
 'Mid his paternal fields at random thrown ?
 Baffle the threat, bright scene, from honest head
 Given to the pausing traveller's rapturous glance :
 Plead for thy peace, thou beautiful romance
 Of Nature ; and, if human hearts be dead,
 Speak, passing winds ; ye torrents, with your strong
 And constant voice, protest against the wrong.

Proud were ye, mountains, when in times of old
 Your patriot sons, to stem invasive war,
 Intrench'd your brows ; ye gloried in each scar :
 Now, for your shame, a power, the thirst of gold,
 That rules o'er Britain like a baneful star,
 Wills that your peace, your beauty shall be sold,
 And clear way made for her triumphal car
 Through the beloved retreats your arms enfold.
 Heard ye that whistle ? As her long-link'd train
 Swept onwards, did the vision cross your view ?
 Yes, ye were startled ; and, in balance true,
 Weighing the mischief with the promised gain,
 Mountains, and vales, and floods, I call on you
 To share the passion of a just disdain.

The next year, Wordsworth's opinions concerning railways were evidently undergoing some change. The line across Morecamb Bay was in process of construction, and the audacity of the attempt to interfere with the domain of Neptune, by running an engine over the sea, raised his admiration of engineering

house of one of them stands a magnificent tree, which a neighbour of the owner advised him to fell for profit's sake. "Fell it !" exclaimed the yeoman ; "I had rather fall on my knees and worship it." It happens that the intended railway will pass through this little property, and I hope that an apology for the answer will not be thought necessary by one who enters into the strength of the feeling.—*Oct. 12th, 1844.*

skill. Even the navvies, the most dissolute and uproarious of their species, came in for a share of his admiration. Upon the Sheffield and Caledonian lines of railway these worthies had signalized themselves by little else than getting drunk and breaking each other's heads, and required the constant presence of policemen to remind them there was such a thing as law in the world. But to Wordsworth's highly-wrought vision, these sturdy swains became delicate amateurs of art and reverent worshippers of the spiritual.*

No doubt, Wordsworth had begun to travel on the line he was so rash to decry, and had found that if it disturbed his repose it diminished the fatigue of his journeys. Reflection also led him to see that the locomotive was an evangelizer; that it was not only an instrument of sordid gain, but the great peace-

* SONNET AT FURNESS ABBEY.

Well have yon railway labourers to this ground
Withdrawn for noontide rest. They sit, they walk
Among the ruins, but no idle talk
Is heard; to grave demeanour all are bound;
And from one voice, a hymn with tuneful sound
Hallows once more the long-deserted quire,
And thrills the old sepulchral earth, around.
Others look up, and with fix'd eyes admire
That wide-spann'd arch, wondering how it was raised,
To keep so high in air, its strength and grace:
All seem to feel the spirit of the place,
And by the general reverence God is praised.
Profane despoilers, stand ye not reproved,
While thus these simple-hearted men are moved?

maker between nations, knitting men together by social sympathies who had formerly never met unless to plunge the knife into each other's throats. It must, therefore, be accepted, even by poets, as one of the agents by which things were climbing up to Plato's ideal, and Providence was shaping to better purposes the destinies of man. The soul might even forget its ugliness in its utility.

Motives and means, on land and sea at war
With old poetic feeling ; not for this
Shall ye by poets even be judged amiss,
Nor shall your presence, howsoe'er it mar
The loveliness of Nature, prove a bar
To the mind's gaining a prophetic sense
Of future change, that point of vision, whence
May be discover'd what in soul ye are.
In spite of all that Beauty may disown
In your harsh features, Nature doth embrace
Her lawful offspring in man's art ; and Time,
Pleased with your triumph o'er his brother Space,
Accepts from your bold hands the proffer'd crown
Of Hope, and smiles on you with cheer sublime.

This avowal, though tardy, showed the reconciliation of the poet with the laws of human development. His new sentiments, however, sat rather awkwardly upon him, and are by no means clothed with that grace and energy which characterize the expression of his misplaced denunciation.

CHAPTER X.

SCOTCH RAILWAYS.

THE first railway north of the Tweed which Mr. Locke laid down, was a short line of twenty-two miles between Greenock, Paisley, and Glasgow. The company was incorporated by an Act passed in 1837, and the railroad opened in 1841. The capital, raised by shares, was £400,000. Mr. Locke brought the line into Greenock close to the harbour, and thereby afforded a more speedy transit for the merchandise of Glasgow to the sea than he had been able to effect for the goods of Manchester. The town of Greenock rapidly grew into importance as the Liverpool of Scotland. Mr. Locke, to provide for the increasing traffic, was obliged to widen the harbour to contain 500 vessels, and enable the ships to float in quays of 20 feet depth.

The railway works were of a heavy character. A way had to be hewn out of the solid rock for six miles, while at another portion a solid archway had to be constructed through the air. At Bishopton Ridge the rock to be excavated was generally from 30 to 40 feet deep, and the walls of the Whinstone stand up with smooth perpendicular surfaces on each side. In the centre of the ridge there is a tunnel,

which derives its light from a hole sunk perpendicularly through the solid whin, for the purpose of providing what is technically called an eye, which in dimensions beat that of Polyphemus hollow, being 70 feet deep, 300 feet long, and 45 feet wide. By the completion of this eye two additional groups of men were enabled to work at the tunnel, advancing from the centre, while two other bands were working at the extremities. The average number of workmen employed was 1,500.

The scene at Bishopton, in connection with the excavation of Whinstone rock by gunpowder at the rate of 15,000 yards per month, was curious. The consumption of gunpowder was almost as great as during a campaign. The passers-by were forewarned of the blasting process by sign-posts, and by the sounds of bugles. The twanging of horns, the grating noise of the iron borers, and the heavy and incessant explosions stunning the ear on all sides like the roar of artillery, might have induced the traveller to believe himself in the neighbourhood of a sharp engagement. Many beautiful specimens of marine shells were discovered at various depths, and in places where it is almost impossible to conceive that the ocean ever spread its mighty bosom. They were generally as perfect as when picked up on the beach, but became very brittle on exposure to the sun.

Had Mr. Locke laid out the line not so much with regard to economical construction as to artistic effect, he could not have bestowed upon the traveller

richer variations of scenery, or more startling contrasts than he meets with upon the journey. Between Greenock and Paisley he is carried close by the river, and has before his eyes some of the finest scenery in Scotland. When the line recedes from the river and takes up an elevated position, it reveals the whole Frith, from a front considerably above Dunbarton, down as far as the eye can stretch, with the mountains of Argyleshire for a background. To a spectator coming from Glasgow, after emerging from the darkness of the Bishopton tunnel, the effect is as magical as if he had suddenly emerged from the regions of Erebus into all the loveliness of Arcadia.

From the eastern side of the tunnel, Paisley lies in nearly a straight line. The arches on which the rails are carried through the town are imposing. The line traverses the heart of Paisley at a height far above the level of the ordinary thoroughfares, and dwarfs all the bridges in the neighbourhood quite as much as the structures of Brobdignag would have dwarfed those of Lilliput. The bridge which Mr. Locke designed over the river Cart contains the largest arch on the whole line. The span is 85 feet. The top of the abutments from which the arch appears to spring is 25 feet 4 inches above the bed of the river. The additional height to the lower part of the arch, or, as it is called, the rise, is 18 feet. The total height from the bed of the river to the top of the parapet is 54 feet 2 inches. The breadth over the parapets is 28 feet. We have said that the arch

appears to spring from the abutments, but the truth is it springs from the foundation, 8 feet below the bed of the river, and is carried up with the same radius all the way. A line, stretching from the foundation on the one side over the arch, to the foundation on the other side, measures 182 feet. The depth of the springers, which weigh from two and a half to three tons each, is $6\frac{1}{2}$ feet. The depths of the other stones decrease as they approach the top, by the following gradations:—5 feet, 4 feet 8 inches, 3 feet 8 inches, and 3 feet. Exclusive of the springers, there are sixty-three stones forming the arch, each measuring in breadth $19\frac{1}{2}$ inches. The smallest stones used in the arch contain 18 cubic feet, and weigh from 27 to 28 cwt. The stones in the two abutments weigh about 2,200 tons, and those in the arch itself weigh about 900 tons. The way in which this bridge has been erected has drawn expressions of approbation from almost every beholder, scientific, practical, and ordinary. The supports in the river were put up with great strength, and on the most improved principle, so as to remove every sensation of fear, either from workmen or spectators. The stones were all conveyed to the crown of the arch on a temporary railway, and in witnessing, from the old bridge, the trucks moving upwards, they looked like a huge land-turtle creeping up a hill with a sheep on its back.

About 1845 Mr. Locke proceeded to lay down a line of railway between Castle Carey and Perth,

called the Scottish Central, comprising a distance of some forty-eight miles. The works were executed and the line opened in the course of two years. This speed was very great ; for, almost contemporaneously with the Scottish, Mr. Locke undertook to construct a line from Perth up to a junction with the Aberdeen at Forfar, with some small branches, extending over a surface of some thirty-eight miles. The Act for this line, called the Scottish Midland, was incorporated on the 31st July, 1845. The average rate of dividend upon this line has been $4\frac{1}{2}$ per cent. ; that on the Scottish Central 6 per cent.

At this period the best mode of connecting the whole of Scotland with the whole of England was still undetermined. Large trunk lines existed, connecting the North and South of England. The problem was how to connect these with Carlisle, and Carlisle again with Glasgow and Edinburgh. In estimating the advantages of the different lines which presented themselves between Glasgow and Carlisle, it was of importance to consider whether one central line could not be found which would afford adequate accommodation both to the East and West of Scotland, and unite them in a direct line not only with Lancashire, and Staffordshire, and Yorkshire, but with Birmingham and London.

But the central portion of the South of Scotland was mountainous ; hence, it became a question of winding round hills, and thereby increasing the length of the line, or confronting steep gradients and heavy

cuttings to obtain a shorter route. The two roads which appeared then most practicable have since been constructed to answer the growing necessities of the towns on the route. But in the infancy of railways the choice of the route which was to connect Manchester with Glasgow, and Edinburgh with London, lay between the dale of the Clyde, with its steep gradients, or that of the Nithe, with its inviting levels, but with an addition of twenty-five miles' distance to the steeper route.

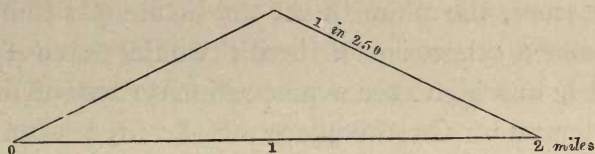
In Mr. Locke's opinion, who had made a preliminary survey of the roads in 1836, there was no line possessing such advantages as the Clydesdale. For the same expenditure of capital, no other line could attain the same great national objects of connecting Carlisle with London, and both with Edinburgh and Glasgow. In twenty hours the mails would reach both these cities from London, and, what is of greater importance, would run along the same line to both places, until within forty miles of each. A concentration of trade on one line would render it profitable, whilst any route where this double object was not attainable would be unworthy of individual or of Government support.

But the great battle was on the question of gradients, in comparison with which all other considerations seemed of minor importance. And the question of gradients between the two lines seemed complicated by problems of a similar character connected with divergencies proposed with respect to each line; but

all involving the same issue, viz., whether short cuts should be purchased by steep gradients, or long levels by an addition to the length of the route. Mr. Locke's opinions were adopted, and the Clyde line preferred. But since capital has been raised for the construction of the Nithsdale line, his suggestion to open, for the sake of shortening the route, a new line from Perth to Kilmarnock, was not carried out. The fact is, the construction of the Clyde line (Caledonian) stripped the suggestion of its utility. For a line of railway previously existed connecting Ayr with Kilmarnock, and it was hardly worth a fresh outlay of capital to construct a branch from Kilmarnock to Johnstone, to effect a saving of some half dozen miles, when the Caledonian conveyed the traveller as fast as he could wish from Carlisle to Glasgow. But the advocates of each line merged all minor differences in the simple proposition, whether it was better, in order to avoid the Clyde summit requiring an average gradient of 1 in 128 for eighteen continuous miles, to adopt the route by the Nithe, on which no such plane exists, at a sacrifice of some twenty or twenty-five miles of distance.

The Clyde summit is about 370 feet higher than that of the Cumnock on the Nithe route, and it was the practice of some engineers to estimate twenty feet of perpendicular height to be equivalent to one mile in distance, and thence to assert the necessity of going round one mile in order to avoid that height. This opinion Mr. Locke confronted by arguments

based upon experiment. On an inclination of 1 in 250, where the gravitating force is equal to 9 lb. per ton, it is ascertained that a railway carriage will remain at rest, or move downwards at a slow velocity. From this it appears that the resistance from friction and air on a level railway is about 9 lb. per ton. It also appears that if in descending a plane of 1 in 250,



the resistance of the carriage is equal to the gravity of the plane, it will in ascending amount to the sum of both, or twice as much as it is on a level. To move a carriage, therefore, up 1 in 250, for the space of a mile, will require as much power as would carry the same carriage on a level line for the space of two miles; but when the carriage has reached the summit, it will run by the force of gravity alone down the corresponding descent of one mile, and by the impetus thus acquired be impelled along the same level plane. If we limit the inquiry to the first mile, the first part of the proposition might be accepted; but Locke held it was not drawing a fair comparison to suppose that one line is to stop at a higher elevation than the other. In the two lines under consideration both lines begin and terminate at or near the level of the sea, and therefore the disadvantage

of the ascent is compensated by the gain in the descent. Mr. Locke had seen a carriage placed on a slope of 1 in 178, and allowed to move by gravity alone. It increased in velocity until it reached twenty miles an hour, and then continued to move uniformly at that speed.

Mr. Locke, however, admitted that, in order to obtain full advantage of the gravitating force during the descent, the plane must not be steeper than the resistance, otherwise a break would have to be applied, in which case a proportionate loss of power would ensue. On the plane of the Clydesdale line (1 in 128) there would necessarily be such a loss of power; but this loss, he maintained, would be far exceeded by the loss arising out of the increased distance of twenty miles. For, taking the friction at twenty miles an hour upon the usual estimate of $12\frac{1}{2}$ lb. per ton, we have in ascent the effect of gravity amounting to $17\frac{1}{2}$ lb., making the total resistance 30 lb. per ton. The returning train down the plane requires no force except that of gravity. Hence the average force travelling both ways on this plane is 15 lb. per ton; showing a loss of about 17 per cent. as compared with a line on which the gravitating force is available in the descent. There was, however, the loss of power on the Nithsdale line arising from the extra distance, and this, on investigation, Locke found more than equivalent to the loss arising from the steep plane at Beattock. The amount of this loss of force, taking the shortest line in each direction,

Locke represented by the figures 104 : 121, Clydesdale being represented by the lesser figure and Nithsdale by the greater. But the cost of locomotive power increased in the direct ratio of the distance run. Hence, omitting the steep plane there was at once an addition of 20 per cent. to the cost of this branch of expenditure on the Nithsdale line. Now, Locke saw no feature in the Clydesdale line which would involve an expenditure equivalent to this cost. There was, therefore, a direct loss of capital on the threshold of the business, and subsequently the expense of keeping twenty miles of road in repair.

A dead level on lines of abundant traffic is undoubtedly best where it can be obtained; but it ought not to be purchased when the interest on the original capital expended would exceed the cost of the increased amount of fuel necessary to surmount the incline. It is a mere matter of calculation. Indeed, in cases where very heavy traffic occurs only in the direction of the incline, and merely ordinary trains have to encounter the ascent, it would be an advantage to have a constant descent in the direction of the former. There is, to a certain extent, a similarity between horse traction and steam traction. It is well known that the most wearying road to a horse is a dead level and straight line, even when bordered with trees, as may be seen in France or the Netherlands. A road of occasional rises and descents suits the animal best; for he can ease his work, and gather strength in the descent by changing

the action of his muscles. And in the same manner the driver of a locomotive can, while descending a steep gradient, make up his fire without mischief from the diminution of steam, and prepare to generate it in much larger quantities, in order to surmount the ascent.

When the locomotive was weak and imperfect, the effect of gravity was too important and formidable to be encountered; and 10 feet in a mile, or 1 in 528, was considered the maximum, beyond which engineers did not think it prudent to go. Considerations of economy soon suggested the propriety of enlarging this slope, and 1 in 330 became the prevailing gradient of the day. This limit also gave way; and 1 in 250, and subsequently 1 in 200 and 1 in 176, were introduced, under the impression that the powers of the locomotive would keep pace with the increasing requirements of these planes. This expectation has been fully realized, in the teeth of the most dismal foreboding and predictions. Some prophesied that in frosty weather the wheels would not advance up the inclines; others, that the engines would be frequently imbedded in snow, or that a strong wind would, with the force of gravity, bring them to a dead stop. But nothing of this sort happened. Mr. Locke had abundant opportunities of witnessing, on the Grand Junction, under the most unfavourable circumstances, engines arriving up a slope of 1 in 180, at more than twenty miles an hour, with loads of heavy minerals, varying from twelve to sixteen car-

riages; and on the Rainhill incline of 1 in 90, the same engine pass up at the rate of twenty-nine miles an hour, with trains varying from eight to ten carriages. From this experience, Mr. Locke was led to expect that further improvements would continue to lessen the disadvantages of steep gradients, and believed that the time was approaching when, in order to do justice to the railway system, economy of construction would require the adoption of steeper gradients, and that the saving thus effected in the original outlay would afford ample compensation for the increased cost of working them, without taking into consideration the advantages gained in the descent.

Though the cost of the Caledonian works was under Mr. Locke's estimates, the Company became involved in difficulties before they could even open the line. The territorial proprietors demanded such exorbitant prices for their land, and the expense of litigation caused by their exactions swelled to so large an extent, that the Company found themselves labouring under a million of debt, not one farthing of which they ever dreamt of incurring. The Parliamentary expenses alone amounted to half a million. The Legislature, which should have thrown the ægis of its protection over such arduous undertakings, really stepped in to aid grasping men in plundering as much of the shareholders' property as possible, and assessed its own charges for the operation at so fearful an amount as to menace the entire concern with financial ruin. The impetus

the Caledonian gave to the growth of the towns on its route, and the large stream of passengers who availed themselves of the route, soon enabled the Company to retrieve their earlier losses. The Caledonian is now paying $6\frac{1}{2}$ per cent.; but if it is at present one of the most prosperous lines in Scotland, its proprietary know that the success has been realized at the sacrifice of an outlay extorted by Government which would have constructed nearly the whole of the line. There are other charges upon the people of this realm besides the assessed taxes, or those levied by the Customs. Every traveller who takes his ticket from London to Glasgow, or who travels by any other line which has been equally favoured by Parliamentary surveillance, has to pay one-third more than otherwise would have been exacted, as a setoff against the exorbitant price of railway legislation.

CHAPTER XI.

THE RAILWAY CONTRACTOR.

IN the prosecution of works so gigantic as were those on the Grand Junction, and of works still more gigantic that were soon to be undertaken, the engineer found how absolutely necessary to his success was the co-operation of other energies. These were the energies of the contractor. In the early stages of these novel enterprises, Mr. Locke had done his utmost to make the task of the contractor as little difficult as he could make it. He trusted that the contractor would soon recompense his pains by removing difficulties from his own. He had insisted upon contracts being let in lengths of ten miles, in deference to the inexperience and limited means of raising money or obtaining credit of those who would tender for them. He hoped that the time would come when the contractor would see almost as quickly as himself, or at least after very simple explanation, the nature and cost of the works which he had to construct; and that the fair remuneration which had accrued from the skilful carrying out of short, would soon enable him to undertake much longer lengths. He had been very patient and painstaking with a number of small capitalists. He

relied upon soon having to do with a few large ones. There would so be fewer people to deal with, and the dealings would be more satisfactorily concluded. He was not doomed to be disappointed. Contractors there were, doubtless, whom railways brought only like bubbles to the surface in order that they might burst and be got rid of. There were some who, moderately successful in small contracts, failed utterly in the fulfilment of large ones. There were others who thought they were safe in undertaking vast works where they imagined they would not be very closely overlooked, hoping to puzzle inspection by the extent and intricacy of their labours; but who soon found to their confusion that the subtlety of their tricks, even when dispersed over hundreds of miles, was quite matched by the subtlety of Mr. Locke's investigation. These, usually denominated scamping contractors, spent the remainder of their time in abusing the engineer whom they had been unable to dupe. Of such and such like the public has heard. We give them a look and pass to a contractor of quite a different stamp, to a contractor who more than realized Mr. Locke's hopes; who, reliable and fortunate in small, was equally fortunate and reliable in large, operations; who brought at once the vastest energies, enormous capital of his own and unlimited command of other people's, an integrity that was almost Quixotic, a word that was better than most men's oath, a simple promise that was more valuable than other folks' guarantee; to a contractor

that came at last to be in all but in name himself an engineer, who knew as well what would have to be done as he knew how to do it. Such a one must have been to the engineer another self, and ought not here to be disregarded. Such a one was Thomas Brassey.

His father, John Brassey, was a clever, energetic, extensive farmer, at Buerton, in the parish of Holford, about five miles from Chester. Thomas Brassey was the eldest son of a large family. Educated at a school in Chester up to the age of fifteen, he then became the pupil of Mr. William Lawton, a land-surveyor, and agent of Mr. Francis R. Price, of Bryn-y-Pŷs, Flintshire. With this gentleman he remained six years. During his pupillage his time was mostly spent in Wales and the border counties, but occasionally at Birkenhead. The improvement of the great coach-roads was at that period the chief object of engineering efforts. Mr. Brassey assisted in making the survey for the construction of a considerable extent of turnpike-road abutting on Telford's great road through North Wales to Bangor and Holyhead. One of the earliest works on which he was engaged as a surveyor, is the one which passes along the left bank of the Dovey from Machynlleth to Aberdovey. It is difficult ever to entrap Thomas Brassey into any allusion to his own performances; but he has been heard to say that he attributes his later success in the construction of railways to the pains taken and experience acquired

in these first lessons in his art. Nor would he probably have said even this little had he not been anxious at the time to impress the truth, of which he is so striking a witness, that unless a man will patiently and earnestly toil in early days, when there is no inducement to toil beyond the consciousness of doing what is right, he will not later have the opportunity presented to him of toiling for more substantial recompense.

At the completion of his pupillage, at the age of twenty-one, he entered into partnership with Mr. Lawton, and went to reside at Birkenhead. On Mr. Lawton's death, he became the agent of Mr. Price, at that time lord of the manor of Birkenhead, and the principal landowner of the district. Left to his own unaided energies, he soon showed what direction they would take, and how successful in that direction they were likely to prove. He at once engaged in road-making; the first work of the kind in which he employed labour to any great extent being a high road from Brownborough to Tranmere, in his native county of Cheshire. In its execution he discovered his own powers and the bent of his genius. These were soon to find a fitting field for their display. The Grand Junction was just being commenced. Mr. Locke was residing at Liverpool; Mr. Brassey at Birkenhead, about a mile from the river. Their first meeting was on the occasion of Mr. Locke invading his house at the unceremonious hour of eight in the morning. Mr. Brassey was at

breakfast, and sent word that he should be happy if his visitor would join him. Mr. Locke had breakfasted. That he had done this, in addition to walking from his house to the boat, crossing the Mersey, and walking up from the river to where he now was, showed at once what sort of man contractors would have to deal with. It was on the subject of contracts that Mr. Locke had called. Thomas Brassey had sent in his very first tender: it was for the Penkridge contract, whose history has been told in the foregoing chapter. Mr. Locke had revised the estimates of the Birmingham engineers; Mr. Brassey accordingly revised his tender. The result is already known. The first experience these two sterling men had of each other was well calculated to inspire both with confidence: the experience of their lives but strengthened that impression. Assistant engineers and contractors used to complain bitterly that young Locke used to walk them off their legs. He thought nothing of walking along the line from Warrington Junction to Birmingham in three days. But Thomas Brassey never flinched: Locke had met his match in willingness to work. From the Grand Junction he followed Mr. Locke to the South-Western. Of the main line of this railway, including the whole of the Gosport branch, Mr. Brassey constructed 118 miles. The average number of men he employed upon it was 1,500, and the money he received from the Company was £4,300,000. But other works, quite as large as these were, did not exhaust his attention. Whilst the

line was in progress he accompanied Mr. Locke to Scotland, and contracted for the works of the Glasgow and Greenock line. He also undertook, at the same period, a portion of the Sheffield and Manchester, and Chester and Crewe railways.

In the spring of 1842, Mr. Brassey took up his residence in Normandy, to superintend the construction of the Paris and Rouen line, which he had surveyed under Mr. Locke in 1840, and for which he had contracted. On this occasion he brought over troops of English labourers, on whose arm alone he relied for the fulfilment of his engagements. They dispersed themselves over Normandy, and formed, by their brawling ways, a singular contrast to the primitive manners of the native population. To the Paris and Rouen, succeeded the Rouen and Havre, the Rouen and Dieppe, the Tours and Orleans, and the Orleans and Bordeaux, with a portion of the Boulogne and Amiens. Whilst the works connected with these lines were in progress, his works upon the English railroads were likewise carried forward with unabated vigour: his time and attention had, therefore, to be simultaneously given to colossal undertakings upon both sides of the Channel. On these occasions it has been computed that Mr. Brassey could not have had less than 45,000 workmen under his direction at the same time. The organization of supervisors, inspectors, and sub-inspectors, by which this industrial kingdom was regulated, made the labour of this vast com-

munity proceed as methodically as the machinery of a clock.

Thomas Brassey became, in fact, a European power. He ruled over a little kingdom ; but, unlike other subjects, his were kept by him, not taxed. They attended him to France, to Belgium, to Italy, to Spain, not like feudal followers, impelled by the lust of conquest and ruin, but ready to follow their liege lord in his grand leadership of developing the resources and strengthening the pacific intercourse of nations. More money passed through his hands in a twelvemonth than through the united treasuries of half a dozen German principalities ; and the liberality and profuse urbanity of the man have bound indissolubly to him all with whom he has ever been brought into contact. Nor had he reached the maturity of manhood before he had written his name on the earth in characters for ever ineffaceable, and as pregnant with beneficial results as any on its surface. But time that brings slackened pace, and wealth that brings comparative love of leisurely ease to most men, have failed to stop or enervate Thomas Brassey. He is still the very Ashuerus of contractors. Men swear they have seen him at different places at times so little removed, that they doubt each other's accuracy. There is not a leading hotel in any leading town in continental Europe where letters are not lying for him. To-day he is in Genoa ; before the week is out he will be at Madrid. Seek him there, he has gone off to Russia. He knows no rest. The two Stephen-

sons, Mr. Brunel, Mr. Locke, Mr. Errington—all have departed ; and these gave themselves something like repose towards the close of their career. They were, all but one, Mr. Brassey's contemporaries. He alone remains, and is in harness still. Parliament has never tempted him—though a dozen constituencies have sought to do so—to desist from his marvellous labours. One of the great pleasures of being a partaker in the constant intercourse between Mr. Locke and Thomas Brassey was to listen to the playfully-put but earnestly-meant efforts of the former to induce this indefatigable worker to take breath. “Why don't you do as I do, Brassey?” he used to say. “Look at me! I come down here to Moffatt, and here I remain for six or seven weeks, and I won't have anything to say to your railways. I ask you to come and stay with me. You come on Monday, and you go away on Wednesday, having tried very hard to get away on Tuesday night, and having spent the whole of Tuesday morning in writing letters ; and you know very well that there is not one of them that required writing at all.” “Well, well, my dear Mr. Locke, I won't write any more letters. But, then, I have my own moor at Roehalion.” Then came more banter :—how Mr. Brassey never went near his moor ;—had he ever been there at all ?—then it must have been with the intention of running a railway over it. And before this volley was well finished, another letter would have been begun. Mr. Locke had originally taken his moor in

conjunction with Mr. Brassey. But he declared, at last, that, as Mr. Brassey never came near except to write these letters on his way from Perth to London, he should have nothing to say to it at all.

It strikes us as highly honourable to these two men that so sincere a friendship could have existed and maintained itself, considering that very often the interests of the one must have come, as more than once of a fact they did come, into conflict with the professional independence of the other. That Mr. Locke was signally inflexible as an engineer, crooked contractors found out to their utter discomfiture, and even straightforward contractors to their occasional loss. But he was the company's engineer, and the most trusted servant of the shareholders. He came to his conclusions in the formation of estimates not till after patient, yet deep-sighted investigation. Guided by the light of his reports, contractors had pledged themselves to do such and such work for such and such payment; and such work and no less should be done for such payment and no more. If they had miscalculated, it was their affair, not his. He had no power to absolve them from their obligations. It was his office to see that they performed them. Thomas Brassey's mistakes have probably been few. But we may be quite sure that, whenever he made them, the only consolation he ever received from Mr. Locke was that he was a fool for his pains, but that it was very satisfactory to know that he could afford to make a blunder. It is not

too much to say, as has been said, that to Mr. Locke's exertions was due the maintenance of a system by which alone railways could be made remunerative. Neither is it too much to say that Mr. Brassey was the first, and is still the most distinguished contractor by whom that system was made practicable. Hence is he mentioned in this biography.

CHAPTER XII.

PARIS AND ROUEN, ROUEN AND HAVRE RAILWAYS.

ENGLISH tram-roads found their way into France through the medium of their inventors. The first was one at Mount Cenis, constructed in 1783 by Wilkinson, an Englishman, for the use of the foundries of Creusot. But their superiority in giving increased facilities to motive power was acknowledged by the French much earlier than by the English Government. In 1823, before the English Parliament had rejected the Stockton and Darlington line, the French Senate had conceded a railway twelve miles in length, extending from the coal districts and iron manufactories of St. Etienne to Andregieux on the Loire. In 1826 and 1828, other extensions from the same quarter to Roanne and Lyons followed, with the view of completing the track of communication between the South and the North, and of expediting the transport of coal and iron from the basin of the Rhone to those of the Loire and the Seine. But there were no attempts to work these lines otherwise than by horses. Even after the opening of the Manchester and Liverpool railway had tested the efficiency of the locomotive, France failed to apply the new power upon any grand scale.

Up to 1838 all the steam railways completed were the two small lines from Paris to St. Germain and Versailles. In that year four railways of considerable importance were conceded to private companies, comprising the distance from Strasburg to Basle, from Paris to Havre, from Paris to Orleans, and from Lille to Dunkerque; but in the following year no funds were forthcoming for their construction. Even the Versailles and St. Germain shares were selling at 40 per cent. discount. It appeared to be a general impression, from the dearth of coke in France, that railways would not pay. Those who had taken up the new lines were Swiss speculators, in whom French capitalists had no confidence. The lines were therefore abandoned and the concessions cancelled. The Orleans Company had managed, after desperate exertion, to get their line as far as Corbeil; but beyond this small section of the way they could not go, and Government was obliged to release them from their obligation to proceed further. Even the line to Corbeil did not prove remunerative, and those who had embarked money in it wished themselves well out of the transaction.

One morning, in the autumn of the same year, the directors of the South-Western Railway held their usual quarterly meeting for the consideration of their accounts. It had been a bad season, and they could hardly make ends meet. While revising the accounts of an impoverished exchequer in their usual humdrum fashion, the advent of a stranger

was announced. He was travelled-stained, but of courtly bearing, and spoke English with a slight French accent. His was no idle mission. He came to talk to them of fields in which they might realize all the golden visions which the fairy suggested to Aladdin, or which Venus pictured to Æneas and his companions, as awaiting their arrival in Ausonia. That stranger was no less than Mr. Charles Lafitte, the chief of the eminent banking firm of that name in Paris, and his errand was to invite English capital and English skill to rehabilitate the railway system, which had become so discredited in France.

He began by representing to them the desperate predicament in which the railway interest lay in his own country, after nine years of triumphant success in England. Through dearth of capital, the mistrust of the inhabitants, the weakness of the spirit of association, the blunders of engineers, the charlatanism of speculators, that interest would not move. There was plenty of traffic, a gently undulating country, a Government anxious to promote instead of throwing obstacles in the way of railway communication, and yet they could not get beyond diligences and steamboats. But if railways were good for England, Mr. Lafitte did not see why they should not be good for France, or why they should not prove as profitable an investment for those who engaged in them south as well north of the Channel. There was one line especially in the establishment of which the South-Western directors had a direct interest,—the

line which would open, by the Southampton railway, a direct communication between London and Paris. The line from Paris to Havre would bring the sea within a few hours' ride of the French metropolis. Passengers travelling by steamboat or diligence from Havre took sixteen hours in reaching Paris. Like the old stage-coach transit from Liverpool to London, it broke into two days. Heavy goods generally took four or five days. By railroad they would reach in as many hours. Besides, the Seine, owing at one time to a redundancy, at another to a scarcity of water, was altogether impassable during the greater portion of the year. Yet even if the traffic between Paris and Havre should continue what it was during the present imperfect means of communication, there was sufficient to make the line more remunerative than any other line of equal extent in England. But with a railroad a thousand new wants and ideas would be created. Even the traffic between London and Southampton would be much increased, as that line, he urged, would become the route between the two leading capitals of Europe, at a time when the traffic between these two capitals would be quadrupled by railway communication.

But Mr. Lafitte was by no means inclined to embark the company in colossal undertakings. He placed his first overture upon the basis of a line from Paris to Rouen, which was only three-fourths of the route and by far the easiest portion to construct. His own estimate of the construction of the

railway and of the profits which might be expected to result from it, rested upon nothing more romantic than the supposition that the then steamboat and diligence traffic took the new route. The profit, even restricted to that limited basis, according to his reckoning could not be less than 14 per cent. upon the required outlay. Government was so anxious to promote the project as to promise a loan of 14 millions of francs, that is 14-50ths of the entire capital, if the required number of shares were subscribed to make up the remainder of the amount. These were divided into 72,000 at £20 each, constituting a million and a half in round numbers. Mr. Lafitte guaranteed that one-half of these shares would be taken up by his own countrymen, if England would meet him half-way. The Board of Directors gave an answer to this effect:—"If we can satisfy ourselves that the statements you make as to traffic and cost are accurate, there will be little difficulty in providing any amount of money for the purpose." Mr. Locke, who was in the room, was thereupon engaged to accompany Mr. Lafitte to Paris and examine the line. Mr. Locke, on reaching France, inspected the plans and sections of the entire works, which had been most carefully prepared by some intelligent French engineers. With these plans in his hand he went over the entire ground. His report confirmed all that Mr. Lafitte had stated. The country was only slightly irregular. The embankments would be light. The heaviest works would be three tunnels and

four bridges. "The longest tunnel was a mile and a half in length, but it was through an excellent material, for the soil was chalk. The bridges would not cost more than £15,000 each. They would be made of wood, with a span of about 100 feet, and have four arches. The French were peculiar for making works of this sort last as long as iron." * The line would be only 80 miles in length, although the turnpike was 120, and the highest gradient 1 in 333. The French estimate of the cost of construction was £1,646,800. Mr. Locke's estimate only differed from it by the small excess of £3,200.

While Mr. Locke was examining the works, Mr. Chaplin, one of the directors, and Mr. Reed, the secretary of the South-Western Company, tested the traffic. They ascertained the statistics of the population of every town on the line of route. Mr. Chaplin boarded the steamboats; Mr. Reed ransacked the diligences. Both these gentlemen, in examining the books of the respective companies, jocularly told the French proprietors they had come to cut their throats. They, however, found no difficulty in obtaining correct information: even returns of those travelling by private conveyances were forthcoming. The shipping freights of Havre, the bales of merchandise sent up and down the Seine, were ascertained to a hair. They laid their hands upon a

* Locke's speech to the Liverpool shareholders of the Paris and Rouen Railway, 22nd July, 1840.

Government document which set down the goods traffic between Havre and Paris at 10,000 tons a day, a result considerably in advance of their estimates. They calculated the annual amount of goods conveyed at 1,008,831 tons, of which 627,263 passed between Rouen and Paris. The passenger traffic was got at with less difficulty. When these prying inspectors could not examine the ledgers of the public conveyances, they noted down their number, their capacity, the days on which they worked, and based their calculations upon the principle that they were always two-thirds full. As the proprietors preferred to compound for passenger duty upon that scale, they inferred that their reckoning must be rather beneath than above the actual number. Nothing brings out so strikingly the invading propensities of the Anglo-Saxon character as these traits. Here were three Englishmen mapping out the Gallic soil, coolly taking stock of one of the main arteries of its commerce, forcing their way into private bureaux, turning over their ledgers, making inventories of its towns, with the presumed object of opening a new highway from the sea, of which they are the masters, up to the walls of the French capital. The case might be put the other way; assuming that London had no port nearer than Southampton, and no railway beyond a small line to Richmond or Hampton. If three Frenchmen, however, had come over to map out the country and change the line of the existing traffic, what a host of susceptibilities and strange jealousies would have been roused.

Though the French are not masters of the sea, the cry of invasion would have been raised with screaming persistence. The surveyors having hurriedly packed up their theodolites and inventories, would have been glad to betake themselves with unbruised bones out of the country.

Messrs. Reed and Chaplin were obliged to accept the railway tariff at the price fixed by Government. The maximum charge for the conveyance of passengers by railway was regulated by the minimum charge for their conveyance on the common roads. The lower fares were taken in proportion. The total amount of gross receipts within the limits of the existing traffic, at the contemplated railway prices both for goods and passengers, was taken at £674,410. This estimate represented a much larger scale of profits than any other line in England; but Mr. Reed added thereto £130,000 more, doubling the passenger traffic; which increase he felt assured would be far surpassed when the railway was established. "On none of the railroads in England," he averred, "has the number of passengers been increased so little as twofold: on some there are nearly twenty times as many as in the stage-coach days. But, as Havre was the port of the French metropolis, and was surrounded with provinces which embraced a population of two millions and a half, if any line ought to increase its passenger traffic from the adoption of the locomotive, it was surely that which brought Paris ten times closer to the sea, and the

most thickly-populated districts of France a day nearer to Paris. To show their own confidence in these flattering predictions, the engineer and his two adjutants requested to be allowed to take 500 shares each. The remaining shares were disposed of in the course of a few days. The French Government advanced its loan, Mr. Locke was appointed chief engineer, and the works began.

The engineer's labours were much facilitated by the zeal of Government to remove all obstacles out of his path, and make it as smooth as possible. Indeed, one of the difficulties which Mr. Locke experienced was the fatherly care which the Government extended to the entire transaction. They took more care of the shareholders' money than the directors appeared to be disposed to take themselves. Mr. Locke would have preferred to construct a new station in the French capital; but the Government obliged him to run into Paris by the line of St. Germain, in order—as the Minister of Public Works declared to the Chamber of Peers—“to prevent the danger of obstructing the approaches to a great capital, and not to entail, by special entrances, an enormous expenditure, and burden the company with costs and charges that the fruits of their enterprise would be inadequate to repay.” For a similar reason, they wished the company to adopt the line of the plateaux instead of that of the valley of the Seine, because it went more direct and easily to the sea, and would connect itself with the northern

roads, and provide with a railway a territory which has, as yet, no other than the common roads. But Mr. Locke saw that this line, though less expensive to construct, would not be so remunerative, as the route which he preferred traversed a richer country, and passed through the active centres of industry and commerce. The company remained firm, and the Government gave way.

The only thing about which Mr. Locke expressed any doubt in the report he drew up for the South-Western Company was the real value of French labour. He had never employed French workmen, and he supposed from the line being a French line that they would have to be engaged in the construction of the works. He soon found that the French contractors, being necessarily new to their work, demanded prices nearly double those which were asked by Englishmen, and that the work when done could not be half so much relied upon even for safety or durability. He was driven, then, to the necessity, in order to bring the works within his own estimate, to employ English contractors, already experienced in works of this kind, and who, besides the skilled labour then at their disposal, brought into France large troops of English navvies to execute the rough part of the contract. Here was another invasion more formidable than anything of the sort before. An army of labourers, fortified with spades, pickaxes, and mattocks, dispersed themselves over the country and took up a permanent position upon French territory. They had come, not like their

forefathers into Normandy, with stanch yew bows and arrows to contest their territory, but to make their roads for them, to instruct them how to raise embankments, to tunnel mountains, to bridge over vales. If the English gentry were content to follow French fashions and adopt their manners, with the English labourer the supremacy was reversed. The French workman at once admitted his superiority, both in quality and quantity of the work done. Instead of resenting the intrusion into his own market of those who had always been rivals and often enemies, he was content to learn their methods of work and improve his condition by following in their steps. Mr. Locke has given us a graphic picture of this incursion of his own countrymen and their effect upon the native population, in his address to the Institution of Civil Engineers.*

“Amongst the appliances carried there by these gentlemen, there were none more striking or important than the navvies themselves. Following in the wake of their masters, when it was known that they had contracted for works in France, these men soon spread over Normandy; where they became objects of interest to the community, not only by the peculiarity of their dress, but by their uncouth size, habits, and manners; which formed so marked a contrast with those of the peasantry of that country. These men were generally employed in the most difficult and laborious work,

* Mr. Locke's address on his election as President, p. 18.

and by that means earned larger wages than the rest of the men. Discarding the wooden shovels and basket-sized barrows of the Frenchmen, they used the tools which modern art had suggested, and which none but the most expert and robust could wield; and often have I heard the exclamation of French loungers around a gang of navvies—‘*Mon Dieu, ces Anglais, comme ils travaillent !*’

“The abundance of five-franc pieces on the Saturday at all the shops and places of trade soon made the distributors of them popular; and it was a remarkable fact, well known at the time, that in tunnelling, or other dangerous work, the French labourer could not be induced to join, unless an Englishman was at the head of the operations. The lawless and daring habits of this class of our countrymen sometimes brought them under the special notice of gendarmes, who, however, soon discovered that it was better to humour, for a time, rather than to attempt to control them, during the excitement which always followed the receipt of their monthly wages.

“There was one complaint, however, which I think it right to notice, regarding the employment of Englishmen in France. It was soon observed and complained of, that the Englishmen earned larger wages than the French, forgetting that the latter, at that time, were physically unequal to much of the work which had to be performed in constructing railways. A piece of coarse bread and an apple or pear, which then formed the ordinary meal of a French labourer,

could not be set up against the navvies' beef or bacon, and none knew the difference so well as the contractors themselves, who always obtained the greatest amount of labour from the highest-paid workmen. Three or four francs a day were then expended more profitably on an Englishman than two francs on a Frenchman; whilst now, it is fair to state, that, by force of imitation, both in the mode of living and in the implements used, there is little, if any, difference in the relative values of the labour obtained from each. The Frenchman has learnt the effect of nourishing food, and the consequently higher rate he can obtain for his labour; so that the result is that this class of work is now entirely supplied by the native population. Thus, it appears, that the introduction of English railway labour, so far from having been a grievance, has, in fact, as previously in the cases of the iron trade and the machinery manufacture, considerably improved the condition of the French working classes."

The same superiority which Mr. Locke found in the English labourer he also found in the English mechanic. France had only one or two manufactories for the construction of steam-engines, and these had furnished only a few locomotives of a very inferior sort. The main supply was got from England. He therefore determined to establish English workshops at Rouen, like those he had assisted to supervise at Newcastle, and brought over a supply of English mechanics for the purpose of teaching France to

construct and repair her own engines, and enabling the company to rely on services entirely under its own control. In this matter he engaged the services of Mr. Buddicom, who constructed, at fixed prices, all the engines, carriages, waggons, and other stock required by the company, and who subsequently agreed to keep them in repair at a fixed rate per kilometre. The success of this experiment has proved most lucrative, both to the company and to Mr. Buddicom, who still continues his labours, and in a much wider field, for he now supplies engines and carriages to most of the companies in France. But no company, owing to these efforts, even at the present day, possesses rolling stock better adapted to railway service than that which has emanated from the workshops at Rouen.

The company had engaged to construct the line in five years. Mr. Locke, however, pressed on the works so quickly that the opening of the line was announced for the 3rd of May, 1843. The Orleans company, which had got the Government to limit their concession to Corbeille, seeing the resolute manner in which the work proceeded, plucked up courage, and undertook to complete the remainder of the line. The two railways were finished about the same time. The Dukes de Nemours and Montpensier, after opening the Orleans line on the 2nd, set out for Rouen to preside over the opening of that railway on the following day. The city put on holiday attire. The priests came forth in their chasubles,

with asperges, book, and candle, to bless the gigantic element which man had trained to his use. Though the line had been constructed by Protestant sinews, out of Protestant capital, with Protestant implements, there was no cry of proselytism. The crown dukes, at the command of their august father, decorated Mr. Locke with the legion of honour, amidst an assembly of some of the foremost men of France. The fêtes lasted for three days. The native population rejoiced as much over the affair as if it had been their own work, as if they were to share not only in the advantages, but to reap all the profits.

The line to Rouen was no sooner hastening to its completion than the preliminary steps were taken to continue it to Havre. The directors had thus used a wise discretion in not binding themselves, at first, to proceed farther than Rouen. At that town the real difficulties of the route to Havre commenced, owing to the chalk character of the country, and to its being intersected by deep and abrupt valleys of denudation. The chalk plateau rises abruptly from the valley of the Seine, and the general plan of the railway is to ascend to this plateau at Rouen and to descend again into the valley of the Seine at Havre. Though the distance was little more than half that of the Paris line, Mr. Locke's estimate was greater in amount. The cost of the Rouen and Paris line was only 22,000*l.* per mile, that of the Havre and Rouen was set down at 30,000*l.* There were five tunnels, of the aggregate length of 5,500 yards, and a succession of

embankments across the valleys of D'Arnetal, Malauny, Bolbec, and Barentin. The line had to cross the latter place at an elevation of thirty metres, and then to pass the high ground, near Pavilly, through a tunnel 2,200 metres in length. The gradients were also so steep as to bring Mr. Locke into collision with the Government engineers. He was examined before the committee of the French chambers, who sat on the bill, with respect to the danger of making a descent on Harfleurs by an inclined plane falling at the rate of 1 in 110. The Government engineers fixed the lowest point of safety at 1 in 200. But Mr. Locke was allowed his way by limiting the descent to 1 in 125. Experience has amply borne out the correctness of his judgment in refusing, for the purpose of avoiding a visionary danger, to put the directors to needless expense.

The magnanimity of the Government, however, was worthy of the occasion. They met the directors in a most liberal spirit. They gave £320,000 towards the undertaking, and lent £400,000 more. The town of Havre lent £40,000. When it is considered that these sums were given without any reserved conditions, and that they were to be spent mainly on English labour, the spirit which prompted the givers cannot be too highly praised. The £20 shares, amounting to £800,000, allotted in equal portions to England and France, were quickly taken up. Mr. Locke undertook to have the entire line ready in three years. It was ready before the time, although

an accident of a very serious nature interfered with the progress of the undertaking.

About twelve miles from Rouen, at the bottom of an amphitheatre of hills, the railway reaches the small town of Barentin. A stream which turns some mills runs through the valley, and flanks a small country road. To bridge this gorge, twenty-seven arches were built, each 50 feet span, and carried to the height of 100 feet. The materials were bricks, made on the spot, except the foundation piers, which consisted of solid masonry. The arches were semicircular, and built like most English bridges, in distinct brick rings. The piers either rested on the solid chalk, or on piles, where the depth of the alluvial deposit, or the contiguity of the river, rendered a rocky basement impossible. The viaduct, which took twelve months to construct, exposed its glittering mass of brick to the sun, with an assurance that seemed to intimate it was destined to last as long as those hills whose chalky slopes it yoked into one continuous road. Yet on the eve of its completion this beautiful curve of symmetrical arches became a wilderness of ruin.

About six o'clock in the morning, as a lad was taking a team of horses up the hill to proceed with the ballasting, he heard bricks falling from the fifth arch on the Rouen side. In a few seconds the arch collapsed; the neighbouring arches followed right and left, rushing to earth with tremendous uproar, until, in two minutes, the whole viaduct fell in,

shaking the hills around as if they had been convulsed by a violent earthquake. The mills in the valley were shattered to pieces, though two or three men buried in the rubbish managed to crawl out unhurt. The noise of this babel of brick rushing together was heard for many leagues; and the red dust for some minutes obscured the heavens. The valley presented the appearance of a chaos as startling as that which we read of in the book of Genesis. The catastrophe was attributed to the injudicious piling of ballast over the more recently constructed arches before the materials had fairly cohered. The resident engineer had already pointed out the danger; and the ballast was to have been removed in accordance with his wishes on the following day. Yet the French papers set up a howl of triumph, charging the English with blundering stupidity, and abusing the French directors for employing foreigners, who swallowed up the money of the country in return for scamped-up works, which jeopardized the lives of their fellow-subjects. The contractor's noble conduct soon gave a quiet answer to these insinuations. Mr. Brassey had, in accordance with Mr. Locke's rule, contracted not only to build the works, but to maintain them in a state of efficiency during a twelvemonth. He spontaneously betook himself to reconstruct the viaduct at his own expense, which involved an outlay of some £20,000. Hence the estimates were kept under the assigned amount, which was the great feature of Mr. Locke's policy.

The success attending the opening of these lines gave a new impetus to railways in France. Capitalists soon discovered that they afforded the best investment for their money. Even the Government rivalled the zeal of private companies in constructing lines along the principal thoroughfares of French traffic. They laid down railways up to what is called "formation level," which included the land, earthworks, works of art, and stations; and let out the working of the lines for a term of years to companies, who would have to provide the rails and permanent road, together with the rolling stock requisite for carrying on the traffic. Encouraged by this system, and a modification of it, under which Government gave subventions of money in lieu of works, new lines sprang up east, west, and south. There were lines from Paris to Lille, from Paris to Strasburg, from Paris to Lyons, from Orleans to Bourges and Bordeaux, from Avignon to Marseilles. When the Paris and Rouen was very near completion, 1,400 miles of railway had been undertaken. Shares everywhere were at a premium. The Northern line proved so prosperous, that the shares at one time went up to 90 per cent. In 1846 they were 50 per cent. The French had learned to bore their own tunnels, construct their own engines, and rear their own earth-works, without the intervention of that army of workmen whom Locke had placed at their disposal. English capital, however, kept pace with French capital, till it received a mortal blow by the revolution of 1848. The depre-

ciation in railway property was 40 per cent. It was rumoured — perhaps from interested motives—that railways were about to be seized by the State, and all foreign property in them confiscated. English capitalists flung their shares on the market, and sold out at a great loss. There was one individual, however, who held as much property in them as any other, and who refused to part with a single coupon, and that was Joseph Locke. It is needless to say how groundless, and how unjust to the character of the French people, was that fear, and how quickly was proved the truth of the saying of Cardinal De Retz, that people are more frequently the dupes of suspicion than of confidence!

CHAPTER XIII.

THE FIRST SPANISH AND DUTCH RAILWAYS.

DURING the great railway stir in 1845, there lived in London a Mr. Roca, a native of Barcelona. While everybody was enthusiastic about some particular line of railway or other, he grew particularly eloquent upon the wonderful things which a railroad would achieve between his own town and Mataro. As he included among his circle of friends some gentlemen influentially connected with the South-Western Company, he did not speak in vain. Mr. Stewart, Mr. Masterman, Mr. Chaplin, and a few others who had found their account in embarking in the Rouen and Havre line, were inclined to repeat in Spain the wonderful success which had attended their labours in France. They therefore engaged Mr. Locke to make a survey of the projected railway, and to examine if the probable returns would yield a fair remuneration for their capital. The result sufficiently verified Mr. Roca's flattering predictions to lead to the formation of a company for the purpose. The required capital was £200,000, half of which was to be contributed by the Spanish connections of Mr. Roca, and the other half by the connections of the English

gentlemen who started the undertaking. After the line was laid out, further operations were suspended till 1847, owing to bad times; but in the spring of that year a contract was made with Mr. Keugel and Mr. Brassey for constructing the works. Mr. Locke's nephew, Mr. William Locke, who had been employed in the original survey of the line, was engaged to superintend its construction. A troop of English workmen was despatched to Spain by the contractors, who began the works at once, and their labours were completed in October, 1848. As the greater portion of the line followed the windings of the sea along the coast, there were no difficulties to encounter in its construction. There were, however, several heavy mountain streams to pass, and one short tunnel to bore of 600 varas in length. All the skilled labour, the rolling stock, and the iron materials, came from England. Those employed on the line, however, were civilly treated by the native population; but they experienced opposition from many of the fishermen and smugglers, whose trade they interfered with by driving them off that part of the beach along which the rails were laid. As the strip of land which lay between the foot of the hills and the sea was very narrow, the railway was first regarded as a sad infringement of their rights. During the construction of the works, Mr. Locke resided at Barcelona, and went over the line when half finished in 1847.

During that period Spain was in a state of political

disorganization. The effects of the rebellion consequent upon the exclusion of Don Carlos from the throne in favour of Donna Maria, had not yet disappeared. Every vagrant freebooter put forward the cause of the brother of the late king as a pretext for his misdeeds, and deprived the traveller of his purse in the name of legitimacy. One of these assumed Carlist chiefs, during the construction of the works, sent a letter to the railway company, calling upon them for about £1,200 as their contribution to the State. The document stated that a proper receipt would be given by this self-constituted authority. It also fixed the time and manner of payment, and held out a threat that if the request was not complied with, the company would suffer for it. No notice was taken of this summons; and the matter appeared to have passed off quietly. But about a week previous to the opening of the railway being announced, news came one morning that one of the timber bridges had been burnt down by the emissaries of this rascal in the night.

But a bolder stroke was made to get at the booty which had eluded their grasp. A few weeks after the opening of the line, the first morning train from Barcelona was stopped by an armed force of 200 brigands. The engine-driver—an Englishman—had orders to unhook his engine. The passengers were made to alight and relieved of what spare cash and jewels they had upon their persons. The chiefs made polite inquiries after Mr. Locke and his nephew, who

they imagined represented the moneyed interest of the concern, and whom, had they been in the train, they would have assuredly carried off to the mountains. The head man of this party was Borjes, the Spanish brigand chief who lately transferred the scene of his operations to Naples, and plundering in the name of Francis II., as he had before done in the name of Don Carlos, was justly shot by the Italian troops.

It was evident that these railways, if allowed to proceed unmolested, would interfere with the brigand's calling. If men travelled at forty miles an hour and in troops of a hundred, the freebooter could not waylay his victim as of yore in a quiet corner of the highway and despoil him of his money. In this desperate state of affairs another bold stroke was made to render even railroads remunerative to the profession. It appears that one Alexander Floricourt was attached to the Barcelona Railway Company as one of its train guards. It was one of the functions of this officer to collect the weekly receipts at the several stations and deposit the money at the Company's head-quarters in Barcelona. The financial worth of the man became known to the freebooters, and they determined to seize him. For this purpose Borjes, at the head of about 100 men, one spring evening, at six o'clock, entered a *café* in Mataro, and carried off poor Floricourt in open daylight, out of a town of 25,000 inhabitants.

The officer was safely lodged in the brigand's

retreat in the mountain, and the modest sum of one thousand dollars demanded as the price of his ransom. Floricourt does not appear to have been admitted to all the rollicking festivities of his mountain home, as he wrote pressingly to Mr. William Locke for the ransom money. But the Company thought, if this demand was complied with, that the abduction of its officers would be frequently had recourse to, as one of the best weapons for replenishing an exhausted treasury. Floricourt, therefore, was obliged to get on as well as he could with his new acquaintances. His captivity, however, was only short; for at that time (April, 1848) Catalonia was covered with the Queen's troops, hunting both Carlists and brigands out of the province; Borjes and his men were in consequence reduced to great extremities, and whilst they were dodging about from one hiding-place to another, Floricourt contrived to effect his escape, and returned home after about sixteen days' absence.

The Barcelona and Mataro Railway has proved a profitable concern to its shareholders from the opening to the present day. It has lately been prolonged towards the French frontier. All its original promoters are dead. They, however, left a model behind them which Spain was not slow to follow. Lines were undertaken from Jarez to Puerto and San Lalar, and from Molina to Madrid.

The grandees, the ministers, and even the sovereigns of Spain subscribed for shares. Corn, which before had rotted in the interior of the country from

the cost and delay of transporting it to the coast, immediately realized a fortune to the owners. Wine, which had previously been carried to the place of shipment at a great expense, became reduced in price; tuns were sold where only hogsheads had been sold before. The commerce of Spain received an extraordinary impetus: the whole country woke to a new life, and nothing was wanting but a little more morality at court, a little more economy in the Government, and a little more activity in the administrative departments, to make Spain redeem her character. The value of men is not to be estimated by their positions. Roca appears a pigmy in comparison with Alberoni, but he did considerably more for his country. The one drove English capital from Spain and sundered the ties of amity between the two countries; the other imported English capital and labour into it, and interlaced them together in a network of mutual interests.

Time was when the connection between Spain and the Netherlands suggested far different thoughts than those of commercial progress or social melioration; but Mr. Locke was destined to supply other links between the two countries than the use of the brand or the delicate machinery of the Inquisition. Fire was the agent in both cases; but that which Mr. Locke represented was not the faggot-pile, tearing the bonds of humanity asunder, infusing savage hate into tender breasts, making man gloat over the destruction of man, but a flame much more in harmony with Gospel

precept, which brought distant people into friendly contact, bound far-removed cities and hamlets in social union, and made each nation feel itself but the complement of its neighbour. It must be confessed that the Inquisition and the steam-engine have worked out results quite opposite to the calling of their inventors: the Inquisition extinguished true religion; the steam-engine in the hands of wealth-seekers bids fair to evangelize the world.

Whilst the greatest minds in France, Belgium, and Germany were absorbed in railway extension, it was not to be expected that the Dutch nature, phlegmatic as it is, would remain long unmoved. The burgo-masters of Amsterdam regarded the excitement, at first, with philosophic serenity. But it became apparent at last, even to them, that if they would keep up with the rest of the world, they must have some speedier means of traffic than those provided by their sluggish canals. In winter their goods transit was entirely at the mercy of the frost. During December and January they were frequently imbedded in ice. In these months no dependence could be placed upon the arrival of goods, whether intended for distribution in the interior or for transference over the German or Belgian frontier. In the winter of 1844 a stoppage of four months took place, and goods imported in November did not reach their interior destination until the following April. Of course, as no country imports a greater quantity of German products than the Netherlands, or offers for them a more varied

and excellent store of colonial produce, this could not be endured. That frost did good service in rousing the burgomasters from their apathy. They drew out a line of railway connecting Amsterdam with Rotterdam, and both through Utrecht with the German and Hanoverian frontier. There was no further work for railways to do in the Netherlands. The company, therefore, thought they should go to the Government for the whole concession at once. The State assented, with this important proviso, that if it chose to liquidate the whole amount expended upon the construction of the works and the rolling stock, it lay at its option to become the proprietor of the railroad after the lapse of fifty years. The company, however, found, notwithstanding the patronage of the king and his ministers, who bought up a large number of shares, that they had taken upon themselves more than they were competent to perform. When they had laid down a single rail from Amsterdam to Arnheim they had to encounter all the inconveniences of a failing exchequer. They, therefore, as was usual in such cases, looked to England for a release from their difficulties. A glowing account of the marvellous profits which the Dutch-Rhenish railway was to yield resounded in the ears of English directors whenever they appeared on 'Change or assembled at their own council board. The line opened to Arnheim, though confined to a single rail and to a pleasure traffic, was paying 4 per cent. What would be the dividend when the freightage of

Amsterdam was brought into connection with the Belgian frontier, and Germany could avail herself of the locomotive to scatter her produce through the Dutch interior? The railway was styled "a lever for the commerce of the Netherlands." The great value was in forming the trunk line of communication through Holland, from west to east, and concentrating at Utrecht, by means of its two branches from Amsterdam and Rotterdam, the immense stream of goods traffic which is conveyed from these cities to the interior of Germany. An English board of direction was soon formed, and Mr. Locke was sent to examine the works which had been completed, and to test the accuracy of the representations upon which such flattering anticipations of the future were based. He went over the entire line of route, suggesting improvements, but confirming, in the main, the report of the Dutch board. The great advantage in the line was the cheapness of construction as contrasted with the presumed profits. For though labour and provisions were dear in Holland, yet the ground was so flat that no expensive works would be required. The cost might be taken at about one-fourth of the outlay that would have been required for a similar undertaking in England. In a country where the cost of railways is so low, and where the population is so great and commercial, Mr. Locke had no doubt they would prove highly remunerative.

Mr. Locke, however, found fault with the gauge: there was no necessity for the 6 feet 6 inches scale

which the company had adopted. It involved additional expenditure without realizing corresponding advantages. It was also at variance with the gauge of the Prussian and German railroads. If persisted in it would necessitate breaks along the Dutch frontier, and much useless expenditure and delay; for the Douane examination might be transferred to the final place of consignment in the interior. He therefore advised the company before laying down the double rail to Arnheim to urge upon the attention of Government the policy of allowing them to bring their gauge into conformity with that of the foreign lines, upon which they must rely for the continuance of their goods traffic. His suggestions in this respect, however, were not complied with; and what with the high rate of taxation in Holland, its declining commerce, and the impassive character of its inhabitants, railroads in that part of the world did not afford so satisfactory an investment as was at first supposed. According to Mr. Locke, the gauge question was one of such importance that no railway could flourish which isolated itself in this respect from the branch lines with which it was brought into connection. The only railway in England which first introduced and yet retains variety of gauge, notwithstanding its rich proprietary and the genius of its constructor, still presents in its empty exchequer and its beggarly dividends a melancholy instance of the truth of that prediction.

CHAPTER XIV.

BATTLE OF THE GAUGES.

THE Great Western was projected in 1833, but met with ruthless opposition from the authorities of Eton and Oxford, who ought, in their double capacity of landowners and guardians of science, to have been the principal promoters of the scheme. But they thought that all academic discipline must end, if London should be brought to their doors by a train which would take young men there and back in the course of an hour or two. Besides, it was in keeping with the character of the elder university, to take her stand upon *antiquas vias*. Innovation in travelling might lead to innovation in religion and politics, and there was no telling where such might end. It must, therefore, be stoutly resisted. Owing to that resistance the bill was thrown out, and opportunity given for the introduction of a complexity in the railway system, which had been attended with a world of expense, and is fraught with obstruction to our commerce, and with danger to the lives of our fellow-citizens.

The Liverpool and Manchester, as well as the Stockton and Darlington line, had been laid down upon the old tram-road system of 4 feet 8½ inches

between the rails. There was no reason for the fact beyond that of actual custom. Both these railways were first projected with the idea that horses, and not steam, would supply the motive power. The locomotives had consequently to be adapted to the rails. It was found, however, that the multitubular boiler was difficult to be got into an engine of such massive dimensions. There was a crank between the boiler and axle, which increased its height. The rapid reciprocation of the piston, consequent upon the narrow wheel, increased its expense. The cumbersome nature of the machinery also rendered it impossible to be cleaned under a day. It occurred to Brunel, the projector of the Great Western, that the rail ought to be adapted to the engine, and not the engine to the rail; that the machinery of the locomotive could be simplified, and its generative power increased, by construction upon a wider basis; that by suspending the carriage as well as the engine between the wheels, the height would be diminished, and the radius of the wheels increased; and that the passenger would find himself in consequence whirled along in a more spacious carriage, with greater safety and increased speed. He, therefore, proposed to lay down the Great Western with a gauge of 7 feet, but kept the innovation a secret until he had obtained the sanction of Parliament. Mr. Braithwaite, engineer of the Eastern Counties, partly for the same reasons, adopted a gauge of 5 feet. But these gentlemen, unfortunately, caught the other railway companies

napping ; for neither they, nor the public, nor even the Legislature, until the broad gauge was partly laid down, appeared to know anything about it.

There was, however, a lion in the path. If each line, left free to choose its own gauge, adopted an exceptional dimension, it is evident the obstructions to railway traffic would have been such as to destroy the benefits of the system altogether. If a cargo of coals from Newcastle, or of manufactured goods from Liverpool, had to undergo three transhipments on their way to Exeter, it would have been much better to have consigned them to the canals. It is as pretty certain that if passengers from Bristol to Edinburgh had been obliged to alight in the night some half a dozen times, and look after the screaming transfer of multitudinous luggage, they would have reverted with a sigh to the comforts of stage-coaches. Mr. Brunel met this difficulty by stating that the Great Western broke ground in an entirely new district. To have introduced the broad gauge in the North would have been an unwarrantable interference with existing traffic. It would have broken a network of railways that ought to be inseparably connected. But in the West of England no lines existed. The Great Western and the lines branching off from it would command the entire district. It was, therefore, free to choose its own dimensions. Mr. Braithwaite applied the same arguments to the Eastern Counties. According to these gentlemen, England was to be mapped out into a heptarchy of railways,

each having no connection with its neighbour, and compelling the unfortunate traveller to alight as often with his effects as if the country had still remained under the rule of its old Saxon masters. Instead of the remotest towns in England being connected by an iron band of railways, even neighbouring towns would have found impassable barriers interposed between them. To an army in motion the obstruction would be tantamount to that of a ferry; to the ordinary traveller that of a custom-house; to goods traffic, not unfrequently to that of consignment over a hostile frontier. In return for these inconveniences the public were to enjoy the advantages of diversified modes of transit and unlimited competition between the various railway lines.

The evils of the system, however, soon began to display themselves just as the necessity which had been said to generate them began to decrease. While the railways were in process of formation, the machinery of the locomotive became very much simplified. The improvements allowed space upon the old gauge for even more generative power than could be commercially required. In the mean time Braithwaite discovered that the Eastern Counties must branch towards the North and have ramified connections with the Midlands. The manifold interruptions to traffic which the break of gauge would involve at the several points of junction at once started up before the vision of the directors. The line had already been constructed to Colchester. Must a third

rail be laid down for the convenience of the narrow gauge, and the line continued on the mixed system, or the rails be broken up and constructed anew on the 4 feet $8\frac{1}{2}$ inch gauge. The latter was thought the most economical procedure. Mr. Robert Stephenson, who had constructed the Blackwall and the Northern and Eastern lines on the 5 feet gauge, to be in harmony with the Eastern Counties, led the way. The rails were taken up without any obstruction to the traffic by working the down and up trains on the same line. The change of the rails of the Eastern Counties followed, at an expense of £52,000. The directors thought themselves well rid, even at so great an expense, of growing difficulties which would have diminished their profits, obstructed the traveller, and weighed like an incubus upon the development of the mineral resources of the country. Some lines in Scotland, which had been commenced on a gauge of 5 feet 3 inches, followed the example of the Eastern Counties.

But Mr. Brunel was not a man to be turned from his purpose by obstacles which influence the minds of ordinary people. He was the Michael Angelo of modern engineering. His conceptions were always cast in a colossal mould. In carrying out these conceptions he paid a chivalric disregard to shareholders' money or the balance of receipts against expenditure, or the extension of commerce, or to the public convenience. Mr. Locke could have built Titanic arches, Acherontian tunnels, steam Leviathans, and Cyclopean

engines, as well as Mr. Brunel; but it was a principle of his that nothing should be called into existence which did not subserve the public interests to such a degree as to make them remunerate the projectors for the capital invested in its creation. Railways and steam-ships, with Mr. Locke, were commercial speculations; hence, if they failed to pay, they ought never to have been constructed. With Mr. Brunel, public roads and carriages ought not to be constructed, or arches raised, unless the one can be made luxurious, the other lofty, and the third imposing. The profit was of minor consideration. If the public did not pay, they ought to be made to pay. A generation of pigmies would grow into a generation of giants if a grand ideal standard was adopted. The attempts of man to overcome nature, whether on the highway of the mountain or on that of the ocean, should assume a grandeur commensurate with the occasion. With Mr. Locke it was of prime necessity that all public works should be constructed upon the most economic principles: with Mr. Brunel it was of prime necessity that they should be constructed with a due regard to the highest principles of æsthetics, let the cost be what, or the money come whence, it might.

But Mr. Brunel was content to meet his opponents on their own ground, and fight them with their own weapons. He laughed at the supposition of travellers being despatched from the West to the North of England, even upon the narrow gauge, without passing from one company's carriages to another, and did not

see any difference between stepping from a broad to that of a narrow gauge carriage, and passing from one narrow gauge carriage to another. Trains going upon a long journey were frequently repacked in the course of the transit, to get rid of useless rolling stock; and the difficulty on these occasions was not to get the passengers out, but to keep them in. Break of gauge would doubtless have been an evil upon a continuous line of route, especially if that line lay through mineral or manufacturing districts. But the Great Western would only be connected with the Midland by a branch line at Rugby, where people were in the habit of alighting to take different lines of route. It also lay through an agricultural country, where he anticipated little merchandise, but a large passenger traffic, and where, in consequence, it would prove more economical to prepare for high speed than to adapt the gauge to any incidental traffic which might come from the North. Besides, minerals or merchandise could be readily transferred without reshipment, by cranes, in loose boxes, from one carriage-frame to another; or they might be run in the same carriages on low trucks along the broad-gauge lines; or a third rail might be laid down to continue the narrow gauge along the Great Western, if the traffic assumed dimensions sufficient to justify the expense. But whether these arguments or expedients could be upset or not, Mr. Brunel was resolute and determined. His personal feelings were interested in the struggle. He stood alone against

the railway world, and the railway world stood against him.

As long as the two systems remained apart and the public had neither the means of comparing the effects of the two gauges upon fares, nor of enduring inconvenience from their contact, the dispute caused little attention. But in June, 1844, the railway projected between Bristol and Gloucester, owing to financial difficulties, fell into the hands of the Great Western. As a direct continuation of the Birmingham line, it was projected, upon the narrow gauge, to bring the merchandise of the North without any break for shipment up to Bristol, and to convey the freightage of Bristol back to the North. Even in accordance with Mr. Brunel's own principles, a break of gauge upon a continuous route of so important a character would have been a serious evil. But nothing else would serve his purpose than to lay down the line upon the broad gauge, and thus interpose a barrier between the mercantile towns and one of their most important sea outlets. The Birmingham men were not long in finding out the mischief. Packages intended for shipment at Bristol were mislaid at Gloucester; goods intended for delivery at Birmingham did not arrive until a week, in some cases a fortnight, after date. When the merchants of Birmingham found the space between their factories and the ports of the Bristol Channel as difficult of transit as when they had to rely on the difficulties of the canal and the river, they boiled over with in-

dignation, called a public meeting, and denounced the break of gauge as a commercial evil of the first magnitude.

The agitation at once assumed an air of national importance. Letters appeared in print; leaders were written and pamphlets published. At length the tide of conflict reached the Parliamentary arena. In 1845 the London and Birmingham and the Great Western Companies were competitors for the railroad between Oxford and Wolverhampton. The railway department of the Board of Trade gave the preference to the narrow-gauge company, on the ground of uniformity. A Committee of the House of Commons, after a protracted inquiry, reversed the decision, on the ground of the superiority of the Great Western line. The Lords confirmed the judgment of the Committee of the Commons. The evidence, however, which had been elicited seemed to point the other way. The war of pamphlets was begun with renewed violence. At length Earl Dalhousie in the Lords and Mr. Cobden in the Commons moved for a Royal Commission to issue, with the view of ascertaining whether, in future private Acts for the construction of railways, it would not be prudent to secure a uniform gauge, and whether it would not be expedient to take measures to bring railways already constructed or in progress of construction into uniformity of gauge.

About fifty of the most prominent gentlemen connected with engineering, with the mineral trade,

with goods traffic, and railway departments, were examined before three commissioners of high scientific attainments, of undoubted probity, and with minds perfectly unbiassed by any railway interest whatever. The inquiry was conducted with great impartiality, and all the evidence that could be adduced upon the subject was sifted with judicial skill. The upshot was that Brunel's positions were overthrown. His expedients for neutralizing the mischief of break of gauge, models of which were exhibited at the Great Western station, were shown to be valueless. The loose-box system had been tried at the Erewash, and at the coal-mines, and failed. Ponderous wag-gons heavily loaded could not be lifted upon broad-gauge trucks without danger of collision with the bridges, and without great expenditure of time, of labour, and money. The laying down of a third rail would be both costly and dangerous. It would, by increasing the number of switches, crossings, and meeting-points, augment the number of accidents. More men would be required to work it, more outlay to keep it in repair. These positions were combated by none but the *employés* of the Great Western Company. They were confirmed by witnesses who had no more interest in the one gauge or the other than the commissioners themselves.

Among the number of witnesses were found the three great engineers of the day—Brunel, Locke, and Robert Stephenson ; the gentleman who had caused the break of gauge, and the gentlemen who were

anxious either to get rid of the mischief altogether, or to reduce it to the smallest possible dimensions. Nothing could be farther apart than the two positions which these giants of the mechanical arts took up. Brunel averred that break of gauge, so far from being a nuisance, was an advantage. If he had to construct railways again, he would adopt a still wider gauge than seven feet. He had realized all the advantages he sought by the adoption of that gauge. The more dispassionate evidence of his competitors, however, which had preceded these statements, showed that they were founded more upon imagination than fact. Mr. Locke remarked that the 10 feet driving-wheels, upon which Brunel relied for increased speed, had been abandoned; that if the trains of the Great Western had any advantage in velocity over those of the narrow gauge, it was owing to its low gradients; and that, even with the advantage of its low gradients, the express to Southampton went quicker than the express to Bristol. Stephenson proved that the broad gauge, besides being more costly in its construction, was more expensive to work and keep in repair. Even if break of the gauge was attended with no inconvenience, he did not see, without counter advantages, why the extraordinary expenditure consequent upon its introduction should be incurred. But the broad gauge had no advantages which the narrow gauge had not, but laboured under several disadvantages from which the narrow gauge was free. The Great Western could not penetrate

into winding districts, which necessitated sharp curves; its dead weight was much greater in proportion to the net load; its wide engines generated more friction, and had more resistance to overcome. Its unwieldy engines were not convenient for branch traffic. Breadth of gauge was too great an evil to justify any advantages which might have been secured by its adoption; but when the system which necessitated it was bad in itself, to persevere in its extension appeared the height of folly. Yet Mr. Brunel's competitors did not counsel its entire abolition. They simply proposed to confine it within the narrowest possible limits. Even the main line to Bristol might be continued. It would be a hardship to compel the Great Western Company to reconstruct their main lines on the narrow gauge. All that could be expected from them was to adapt their main line to narrow gauge trains where it was necessary to avoid interruptions to traffic, and to construct their branch lines upon the narrow gauge. A third rail, or, what would be much safer, double rails, should be laid down from Oxford to London, and from Bristol to Gloucester. If the branch line from Basingstoke to Reading, and from Oxford to Rugby, were then constructed upon the narrow gauge, the South-Western and the Midland lines would be interlaced, and the ports of Bristol and Southampton brought to the doors of Birmingham and Manchester. These were dispassionate propositions. Neither Locke nor Stephenson wished to interfere with other people's

crotchets. They only desired to protect the traffic of their own lines from being injured by them; and with the uninterrupted traffic of their own lines was bound up the development of the commercial resources of the country.

The argument which Brunel drew from one company's carriages never venturing upon another's lines except at a manifest disadvantage was completely annulled by the extension of the clearing-house system, which allowed a complete interfusion of this species of cross-traffic, at a manifest gain, not only to the public, but to the various Railway companies themselves. Direct lines had no sooner been established between cross towns than passengers demanded to be booked through. The same convenience was required for the transfer of goods and cattle. Even one company during stress of traffic was glad to borrow rolling stock from another company. Hence each had to square accounts with its neighbour, and a solidarity of interests grew up between all. Returns were compared at the different clearing-houses of the number of waggons, packages, and passengers sent from cross lines, with similar returns of other companies, the balance struck, and transactions frequently involving thousands of pounds settled by the transfer of a few hundreds to the companies' bankers to whom the overplus was due. This weekly interchange of interests tended to produce harmony and uniformity in their respective arrangements, by which the public are the first to

profit. The railway system was thus brought by the sheer force of circumstances into unison with that of nature. There was an adaptation of parts, a working of one branch into another, with a view to secure to the nation the utmost possible advantage from the whole. With this blending of interests and reciprocation of strength, from which the entire railway system derived the organic unity of a living body, Brunel's projects would have completely clashed. They would have substituted discord for harmony, antagonism for unity, weakness for strength. Brunel would have got rid of the advantages accruing to the nation from the mutual disposition of the several lines to economize their force and work together for the public convenience, in order to introduce the other species of advantage arising from the diminution of their force and the setting of each company by the ears. He would have torn the links asunder by establishing through his branch lines the break of gauge in thirty different places. It is very singular he should have laid the greatest stress in his defence upon the consideration which went a greater way than any other to refute himself.

If the wealth of the country and the commercial superiority it possesses over surrounding nations rest upon its mineral resources, anything which interferes with their development should be scrupulously guarded against. But the broad gauge interposed a double barrier to that development. By destroying uniformity it necessitated frequent tran-

shipment, which materially diminished the value of coal, while it increased the price of transit. Its wide lines were particularly unsuited for the sharp curves of mining districts. Its heavy waggons were as unsuited to the light traffic of agricultural districts. In one case break of gauge was necessitated; in both, expense of freightage increased. Whether the broad gauge, even without the interference of break, be regarded as the channel for the conveyance of the agricultural produce of the West to the commercial districts of the North, or for the transfer of the manufactured industries of the North to the agricultural communities of the West, it would have been equally unfortunate: but, with the break of gauge in thirty different directions, which Mr. Brunel projected, the attempt would have been destruction. The proposition was like forbidding the banns between the union of the agricultural and commercial interests of the country, upon the consolidation of which the happiness of society so much depends. The mining resources of England could not have been impaired without injury to the agricultural resources. But Brunel's plans were so pregnant with mischief that they would have made short work with both at the same time.

The report of the Commissioners was such as the evidence might have led any impartial listener to expect. They adopted the advice of Locke and Stephenson. Parliament was advised to allow no more broad-gauge lines to be laid down, and to get rid

of break of gauge by laying down rails along the Great Western with the view of allowing narrow-gauge loads to pass over such parts of the line as were required by them in order to reach their destination without transshipment. But Parliament worded the Gauge Act, which purported to be founded on the report of the Commissioners, so loosely as to leave the door open for any Parliamentary committee to extend the evils which it was the special object of the Commissioners to avert. The Great Western directors, in consequence, by watching their opportunity, and by engrafting sly provisions in their private bills, got permission to construct their branch lines on the broad gauge, and were only required to lay down double rails along their lines where extraordinary traffic from the Northern or South-Western Railways suggested this step as a more economical mode of getting over break of gauge than transshipment. The number of miles of railway on the broad gauge were in this manner soon doubled. The mixed gauge was introduced to a proportionate extent. Railway travelling became, in consequence, more costly and more dangerous. Millions of money were wasted in order to substitute in the railway system complexity for simplicity, and peril for safety.

The evil became so patent, and threatened so much to grow, that Mr. Locke was induced, when many additional lines on the broad gauge had been sanctioned, to address a pamphlet to Lord John Russell

on the subject, which created some attention and went through several editions. Taking Robert Stephenson's estimate of the additional expense of mixed gauge at £4,000 for the three-rail system, and £6,000 for the system of four rails, he stated that the extension of the broad gauge north of Oxford would necessitate an additional outlay of upwards of £800,000 sterling. There was also the additional item of £100 per mile to keep the mixed gauge, which such a step would involve, in a state of repair. This was only the first step in the system, which Mr. Locke averred, if carried out, would be attended with a useless outlay of forty millions. Mr. Locke showed that the only practical consequence of this prodigal expenditure would be to multiply accidents and imperil life and limb.

“ It is admitted that the safety of a train in rapid motion on two narrow bars of iron, called rails, is not likely to be augmented by increasing the number of breaks or openings in the rails by what are called switches, points, and crossings; on the contrary, all persons agree that such breaks in the rails for local convenience in making sidings or branch lines, diminish, in some degree, safety at high speeds, and that but for such purposes they ought to be avoided. But such breaks will be fearfully increased by the mixed gauge. For whilst in what is technically called a through crossing (a connection between one line and another) there are in a simple gauge but two crossings and two sets of switches, there will be

twelve crossings and four sets of switches necessary for the double gauge, and five switches and eight crossings for what is termed the three-rail system. The crossings for local convenience are necessarily numerous, and thus this enormous augmentation of risk must be incurred wherever these communications are required. There are now on the main line of the London and South-Western Railway, between London and Southampton, 130 switches and 130 crossings, or breaks of rails. If the double gauge were adopted, there would be no less than 260 switches and 780 crossings, in order to give the same facility of access to both gauges."

Mr. Locke then proceeded to show that by the adoption of the mixed gauge there could be no competition, and that Brunel's picture of the advantages which were to result to the public from this source, by the adoption of the broad gauge, must be given up. In fact the sanction of the mixed gauge by the Great Western was an open acknowledgment that the break of gauge was an evil which they formerly pronounced a benefit. The remedy, however, would not lessen the disease it was intended to cure, but increase it.

"That there is an evil in the break of gauge is now admitted, and the mixed gauge is put forward to lessen it; but it is evident that the farther you push the one gauge into the district of the other, the greater will be the number of breaks, and the greater will be the evil. For instance, if all the three lines

from Oxford to Rugby, Birmingham, and Wolverhampton, were to be laid on the narrow gauge only, there would be but one break at Oxford, instead of one at *each* of the three other places; and the number will increase in proportion as the broad gauge is allowed to penetrate to other northern places.

“ With the view, then, of avoiding the evils which must necessarily arise to the railway system by such extension of the mixed gauge, it is my intention to show your Lordship that, for a far less sum than is now about to be laid out on the mixed gauge upon the three lines I have named, a railway communication of continuous and unbroken gauge may be completed between the South Coast and the North of England on the one hand, and the Metropolis and the whole of the North of England, by the Great Western Railway, on the other. The mode of doing this is simply by laying the narrow gauge concurrently with the broad gauge from Oxford through Reading to London, and from Reading to Basingstoke, in all 77 miles. This might be done either by independent lines, or by a mixed gauge; and although the latter would, I admit, be an evil, it would be much less in extent than it could be by any other arrangement, short of altering the broad gauge to the narrow.

“ The narrow gauge must be laid from Oxford northward; but why lay the broad gauge at all, as proposed by the Great Western Railway Company, at an expense at the outset (from the mixed gauge) of more than eight hundred thousand pounds sterling? Why

not, instead, lay the narrow gauge from Oxford to London, at one-third of the cost ?* If this were done, the Great Western Company could more effectually compete in the North, if that be their object, with the North-Western, than they can ever hope to do with breaks of gauge at either Rugby, Wolverhampton, Birmingham, or Oxford. And for the South Coast, let the Great Western Company carry out the pledge often made by its chairman, to lay the narrow gauge from Basingstoke to Reading; and thus the North and South Coast districts, at a cost of less than £100,000, would be saved the annoyance and expense of any break of gauge whatever.

“ Lord Redesdale, in his evidence this year before the Committee of the Lords, on the Oxford and Birmingham Bill, said most truly, that the extension of

* “ There are upwards of 220 miles of proposed railways north of Oxford now sanctioned on the broad gauge, and not yet executed. Taking £4,000 a mile for the cost of the three-rail mixed gauge system, instead of £6,000 for the system of four rails, as estimated by Mr. Stephenson, the extra cost of transferring the break of gauge from Oxford to Rugby, Birmingham, and Wolverhampton, instead of keeping it at Oxford, will be eight hundred and eighty thousand pounds. This shows, in figures, the cost of the first step in mixed gauge. The last step will probably be 10,000 miles (for there are already 9,600 miles sanctioned on the national gauge), which, at the same rate, will amount to no less a sum than forty millions sterling. Expended for what ? To impair, and not to improve, a system which will already have cost two hundred millions sterling. To avoid this outlay, if the narrow gauge were extended from Oxford to London and Basingstoke (seventy-seven miles), we should, for a third of a million, absolutely get rid of all break of gauge whatever in this quarter of the country.”

the mixed gauge was a public question, and should be dealt with by a public and not a private bill. It is admittedly costly and complicated: it is feared that it will introduce inconvenience and danger into the railway system; and its general effect on that system ought to be considered in a more comprehensive spirit than is admissible in judging of a private bill. If the mixed gauge be safe to Rugby, Birmingham, and Wolverhampton, it will be so to Liverpool, Manchester, Glasgow, and Edinburgh; and, indeed, how can it be resisted on any railway now existing, or to be hereafter made? The arguments which, on local grounds, carry the mixed gauge at present will apply to all future extensions, and, adopting these arguments, the railway system of this country will become universal mixed gauge, although every mile of such construction will be less simple and less safe than if it were of the usual construction.

“What a result! England, which has given railways to the world, would see France, Belgium, Germany, Italy, and the United States advancing in railway enterprise on a uniform plan—the gauge which England furnished to them; and she would stand alone in the anomalous position of having (because one man of great genius disdained to pursue the path pursued by others, and because Parliament, being careless and indifferent to the subject, allowed one powerful company to deviate from the general plan) engrafted on her railway system a duplication, a complexity, and a ruinous expense, of which I am

satisfied it would be said that could they have been foreseen they would never have been tolerated. Why then, my Lord, should we pursue a policy which is gradually destroying the capital now invested in railways, and why should we lessen the safety of railway travelling? Why was the Gauge Commission appointed, and why are its warnings disregarded?"

Mr. Locke's admonitions met the fate of those of the Gauge Commission. They were addressed to a Government which had inherited the insouciance of Melbourne, who did not feel disposed to grapple with any great questions, but who were content to let their subjects tear each other to pieces as much as they pleased, provided they did not turn their attacks on Downing Street. For eight years the contest continued in the meeting-rooms of directors, and before the committees of the House of Commons. The battle in the Parliamentary arena threatened to absorb all the available railway capital of the country. Two companies contesting this question of gauge, in reference to a line between London and Exeter, spent no less a sum than would have paid for the construction of the entire line itself. The marvel was, upon all these occasions, that the right side, which was advocated by the many, was completely defeated by the wrong side, advocated by the few. One company stood against the interest of all the other railway companies in England, and against the example of all the other railway companies in the world, and gained a triumphant series of successes,

in the teeth of the national interests, and in defiance of common sense. Parliament, instead of terminating the conflict with an authoritative voice, seemed to foment it, in order that railways might quietly destroy each other. A hundred and twelve millions of capital invested in forty of the foremost railways, by the legal expenses which the contest involved, sank to seventy-five millions. Yet the Legislature still kept the question open, as if its interests in the discussion were identical with the hundred lawyers who have seats in the Lower House. In Ireland, where the railway engineer broke entirely new ground, the Government, to show its strict impartiality, confined the gauge to a medium between the narrow and the broad. In that part of the world uniformity must be established on the intermediate scale of 5 feet 3 inches. But in England the Legislature abdicated its high function of deciding upon the gauge of a railway, in favour of the private committee who had charge of the bill. The practical effect of this coyness was to give rise to illimitable expenditure, in order to secure permission to construct lines three times more costly and more dangerous than those which ought to have been laid down. The expense of railway travelling increased, and the price of railway shares diminished in proportion. By the battle of the gauges, as great a burden has been imposed upon the resources of the country as by any other battle of more violent warfare which modern history recounts. The country paid ninety

millions for the campaign whose crowning feature was Waterloo, and generations yet unborn have to pay the interest of that amount charged upon the Consolidated Fund; but it was too much to waste even one-fourth of that amount, not for military glory nor for the proud boast of bivouacking in the Gaul's capital for the fifth time, but for the pure pleasure of jeopardizing the safety of her Majesty's subjects, and for imposing, by increased rates, the interest of that amount as a permanent tax upon them and their successors for ever.

CHAPTER XV.

THE FRENCH CONTRASTED WITH THE ENGLISH
SYSTEM OF RAILROADS.

MR. LOCKE, while absorbed in the practice, did not neglect the theory of his art. In the concerns of the Institute of Civil Engineers, whose well-arranged library and scientific meetings are a credit to the profession, he took a prominent interest, entering with eagerness into the discussion of every engineering subject, from the fastenings of a sleeper to the construction of a tunnel; at one time overthrowing some wretched sophism in connection with gradients, at another establishing the fact that one-half of the capital spent upon railroads, for what good it had effected, might as well have been thrown into the sea; and that if the construction of the locomotive was the highest triumph, the mode in which that agent had been applied evinced the lowest decrepitude of the human intellect.

In his inaugural address, on taking the chair as President of the Institution of Civil Engineers, Mr. Locke betook himself to a topic which no man in Europe was more competent to treat. He undertook to sketch the principles and character of the French railway system, and contrast them with

our own. The practical results of the English system he designated to be immense convenience and advantage to the public who use, inadequate profits to those who have made, our railways. In France it was precisely the reverse. The capital invested has yielded a handsome profit, whilst the service to the public, although far in advance of all its former means of conveyance, is still very limited in comparison with ours. Our superiority in the one case is intelligible; our inferiority in the other requires explanation. Locomotive power is much cheaper with us than our neighbours. "Density; movement and wealth of population; activity of trade and manufactures; habits of despatch and intercourse in the natives; the resort of strangers; the cost of necessary materials; practice and skill in their manipulation;—these, and other points of less moment, were clearly in favour of our railway enterprises. It might be difficult, indeed, to say what amount should be added, on these grounds, to the evidence of actual returns, in order to a just estimate of the respective systems. But there can be no hesitation in asserting that, viewing the relative conditions of the two countries — apart from disturbing circumstances — the result, as between them, of the experiment of railways, ought to have been a higher rate of profit in England than in France."

The main cause of the discrepancy must be ascribed to the patronage which Government has extended to

railways in one country, and the heavy discouragements it has dealt out to them in the other. About one-fourth of the cost of railway construction in England is swallowed up by parliamentary expenses ; and yet Government has not protected the lines, which it has conceded, from the dangers of competition : in fact, it has stimulated competition by conceding rival lines, and thus depreciated the capital invested in these undertakings. In France there have been no parliamentary expenses ; Government, instead of absorbing the property of capitalists in preliminary proceedings, actually increased that capital by judicious loans at nominal rates of interest, and rendered the preliminary proceedings as simple and inexpensive as possible. The transfer of land is easy : the value of the expropriation is settled by agreement or by a jury : the State shelters the company from all vexatious suits, and from the effects of competition. Hence, the expense of railroads in France is limited to the construction alone, and to the equitable value of the land which is purchased by the company. The capital, therefore, invested in them, taking mile for mile, is hardly more than one-half of what would be paid for the construction of an equal amount of railroad in England. Government also commonly guaranteed four per cent. interest, to induce capitalists to embark in these enterprises. But so successful have railways proved in France, that no claim has ever been made on Government for defective remuneration.

The patronage which the French Government first extended to railroads has never changed, though it has varied in application. As has been already told, the State was authorized, by the law of the 11th of June, to construct the railways up to what is called formation level, and to let out or farm for a term of years the working of the line to companies; but a feeling arose in France against the making and working of railroads by the State, which induced the Government to grant pecuniary subventions in lieu of works, varying the amount to suit the necessities of each case. "In order to show how far this system of 'subvention' was carried, but without detailing each individual grant, I will endeavour to state the gross amounts supplied by the State in successive years, down to the end of 1856.

"From 1823 to 1842 the private capital required for the conceded lines amounted to £7,000,000, and the State contributed the sum of £120,000 only. In the six years including 1842 and 1847, the private capital amounted to £17,000,000, and the State expenditure to £9,280,000. From 1848 to 1851, inclusive, the private capital was £8,000,000, and the State contribution £12,000,000. From 1852 to 1854, inclusive, the private capital was £29,240,000, and the State contribution £3,840,000. In 1855 and 1856 the private capital was raised to £35,520,000, whilst the State contribution had fallen to £1,200,000. If to these be added the engagements taken for lines already conceded, and

not yet executed, but which are spread over from five to ten years, we shall have the whole financial condition of the French railways exhibited in the following table:—

| | Private Capital. | Contributions of the State. | Length of Lines conceded. | Length of Lines opened. |
|----------------------|------------------|-----------------------------------|---------------------------------|-------------------------------|
| From | £. | £. | Miles. | Miles. |
| 1823 to 1842... | 7,000,000 | 120,000 | 550 | ... |
| 1842 to 1847... | 17,000,000 | 9,280,000 | 2,250 | 1,156 |
| 1848 to 1851... | 8,000,000 | 12,000,000 | ... | ... |
| 1852 to 1854... | 29,240,000 | 3,840,000 | 5,770 | 2,900 |
| 1855 to 1856... | 35,520,000 | 1,200,000 | 7,030 | 4,060 |
| Still to complete... | 96,760,000 | 26,440,000 | | |
| | 21,200,000 | 9,200,000 | | |
| | 137,960,000 | 35,640,000 | | |
| Total...£ | 173,600,000 | | | |

“ The total estimated cost, therefore, of the 7,030 miles conceded, stands at £173,600,000, or about £24,600 per mile ; say £19,600 per mile contributed by the companies, and £5,000 by the State. It must be borne in mind that I speak of estimated cost, and that I am dealing with figures and estimates on which the Government has based its legislation ; and since out of the 7,030 miles conceded up to 1856 only 4,060 were then opened to the public, it would be premature to say that the actual cost will correspond with the estimate.

“ This table exhibits considerable fluctuation in the proportion granted by the State at different periods ; and we observe a rapid decrease in its advances since the year 1851, and a greater expenditure consequently thrown on the companies. It appears that from 1842 to 1851 the State contribution was £21,280,000, as against £25,000,000 furnished by the companies ; whilst from 1851 to 1856 the State only provided £5,000,000, as against £64,760,000 furnished by the companies. It might not be difficult to assign a reason for the variations here exhibited, which, however, are more apparent than real ; for it will be found that, while making the larger advances,—whether under the law of 1842, or in the modified shape of subventions,—the State was securing an important reversionary interest in the railways, which was afterwards abandoned, in order thereby to get rid of the more pressing demands for money.

“ The law of 1842 had the advantage (for the State) of engaging companies to work the lines on leases of very short duration, say from twenty-eight to forty years. But, at the same time, it drew largely on the public treasury ; and it was probably found more convenient, as the confidence of private capitalists increased, to attract them, by extending the periods of concession to ninety-nine years, as had been the practice before 1842. To this end the guarantee of four per cent. interest was liberally extended, and a remission made of the right to a share in the profits, after a certain amount of dividend had been paid to

the shareholders. In getting rid, therefore, of the contribution,—which either in works or in money, in 1851, pressed so heavily on the State,—it was obliged, not only to lend its credit in the shape of extended guarantees, but also to give up some of the advantages expected from a participation in railway profits. The amount of capital, either in shares or bonds, guaranteed by the State, in 1851, did not exceed six millions; whilst in 1855 it rose to sixty millions, and is now applicable to 5,200 miles of railway. The companies who partake of it are, chiefly, the Orléans, Lyons, l'Ouest, Mediterranean, Midi, and Grand Central.

“In like manner, the right of participation, which had applied to nearly all the lines founded on the law of 1842, has been abandoned as regards the recent concessions, and is retained only on those in which the provisions of that law, or an equivalent in the shape of subvention, has largely entered into the terms of arrangement. At the present time the right of participation applies to 3,500 miles; chiefly with l'Est, Lyons, Mediterranean, Midi, and Grand Central companies. I may add, that in the recent amalgamations of several of the great companies in France the prolongation of term, with an increased capital guaranteed, and a diminished subvention, seems to have entirely superseded the law of 1842.

“Throughout all these changes, however, it will be seen that almost from the very beginning of the

French railway system,—but especially from 1842 down to the end of 1856,—the rule has been that, in one shape or another, and with varying degrees of liberality, these undertakings have always received a certain amount of direct assistance from the State, in addition to the protection secured to them by the operation of that general principle of control, to which your attention has been already directed.

“ Whilst, however, the direct control of the State has protected French railway enterprise from the rivalries of party interests, and the wasteful expenses of competition, and whilst it has been aided by subventions, loans, and guarantees, the Government has not lost sight of the advantages to be drawn from it in return. It has secured to the State the mail service of France, free of charge; it has laid a 10 per cent. tax on passengers, and on first-class goods; and these two items, alone, are now estimated to yield more than 5 per cent. on the whole of the £36,000,000 given in the shape of subventions. On behalf of the State there has, further, been secured the participation in dividends, on many of the lines, after a certain per-centage is paid to the shareholders; the low tariffs fixed for soldiers, sailors, prisoners, paupers, &c.; and, finally, the possession, at the end of their concessions, of all the railways in France, which up to this period are estimated at £173,000,000 sterling. It would thus appear that the system has, so far, reconciled the two important interests of the promoters and of the State, with

considerable success; that while substantial benefits have been secured to the latter, the former have been enabled to derive a liberal return for their outlay; in short, that the railway interest in France has not, as in England, been made a victim of public exigencies and of private cupidity."

Another cause beneficial to railway property in France is, that the service which is there considered sufficient for public convenience is more limited, both in frequency of departures and in speed, than is required on English lines. On referring to the ordinary time-tables of main lines in both countries, the difference on this head to the advantage of France will be found equal to about 20 or 25 per cent. But were the departures and speed, on those English railways which are under the strain of direct competition, introduced into the comparison, the per-centage in favour of France would be nearly doubled.

Another custom which tends to diminish the expense of working is the employment of females on French railways, "especially in certain offices of the booking department, as well at the principal, as at minor stations. At the level crossings, too, females are employed: the head of the family being engaged on the line, whilst his wife or daughter opens and shuts the gates when required. They are found quite equal to the men in the performance of the duties assigned to them, while they are content with lower wages. The usages of the country, where this kind

of substitution takes place in many other departments of business, find nothing strange in a practice which, however convenient and economical, would be thought in many respects questionable in ours."

"An element of considerable importance in the finance of French lines is the proportion of share capital to the amount raised on obligations, or bonds. In the whole of the capital provided by companies, amounting, as we have seen, to £137,960,000, there is less than £50,000,000 in shares, or about 37 per cent. of the whole; whilst the remaining 63 per cent. has been raised on obligations. The Company 'du Nord,' for instance, had an original share capital of £8,000,000, on a concession of about 370 miles of railway. It subsequently reduced its shares from 500 francs to 400 francs, making the capital £6,400,000, and it remained so fixed at the end of 1856, although its engagements were then increased to £13,000,000. The Company 'l'Est' had an original share capital of £5,000,000. It has subsequently doubled its capital; but its engagements by new concessions were more than quadrupled, being nearly £21,000,000. The Paris and Lyons Company, with an original share capital of £4,800,000, subsequently raised to £5,280,000, has engagements estimated at nearly £14,000,000. The Company from Lyons to the Mediterranean, in like manner, has a share capital of £1,800,000, whilst its estimated engagements are £6,800,000. The Orléans

and the Western Companies are in a similar condition, each having a share capital of £6,000,000. The former having £13,000,000, and the latter £17,500,000 of engagements by new concessions.

“Thus by far the largest amount of railway capital was raised on loan, at a fixed rate of interest; and it is evident that, according as the dividend on the whole capital varied from the interest paid to the bondholder, a profit or loss would accrue to the company from the operation. In order, therefore, to a just comparison of receipts with our railways, the per-centage of net income must, in both cases, be taken on the whole capital raised—a process by which the per-centage would be considerably reduced on the French side, and be raised on the English; preference stock, in the latter, being included in the category of borrowed capital, which it virtually is, although lent by proprietors. The rate of interest on loans may be taken as practically the same, say about 5 per cent. on both sides. This being premised, it follows that it will depend on the ratio of net profit to the whole capital expended, whether any portion of it raised by loans at a fixed interest will increase or lower the rate of dividend on the remaining portion. Take, for instance, two railways, each having cost £1,000,000, one of which would produce on that cost a net profit of 4, and the other of 8 per cent. It results, that in the one case, to borrow half the capital at 5 per cent. must reduce the sum left for dividend, on the

£500,000 in shares, to £15,000, viz., from 4 to 3 per cent.; while the other, by borrowing half its capital at the same rate, will raise the dividend, on its £500,000 in shares, to £55,000, *i.e.*, from 8 to 11 per cent.

“Such is the operation when the borrowed capital is the same in both cases. But let us assume that in the former case, as in England, it amounts only to one-fourth, or to one-third, and in the latter to two-thirds. We shall then find that in the first case the reduction from 4 per cent. is only one-half per cent.—viz., to $3\frac{1}{2}$; while in the second the dividend on share capital is raised from 8 to 14 per cent. It thus appears that the decisive element in both is the ratio of net profit to the whole capital spent in a given undertaking: and that the reason why French dividends are augmented by borrowing so much, is solely that the rate of profit earned on the entire cost is in excess of the current rate of interest; while English dividends are impaired by the same process, because here this condition is reversed.

“It has been estimated that the profit made by the railway companies in France by this mode of raising funds, amounted, in 1854, to 3 per cent. on the whole of their share capital. I am inclined, however, to believe that this estimate is not sufficiently high; for I find that the average annual dividends paid from 1854 to 1857 by the following companies amounted to:—Nord, 14; l’Est, 14; l’Ouest, 10; Paris to Lyons, 16; Orléans, 16; Lyons

to the Mediterranean, in 1855 (the first year of its entire completion), 17; and in 1856, 23 per cent.

“It must not, however, be overlooked, that in all the French lines provision is made by law for extinguishing the capital by what is termed an *amortissement*, payable out of revenue every year during the period of concession. In the origin of railways the law fixed the amount of this at 1 per cent., but it was found more than sufficient for the purpose; and the Government then consented to a modification of the law, which, spreading over 99 years, did not require more than about one-fourth, or one-eighth per cent. in order fully to redeem the capital within that time. The mode adopted is to cancel every year by lottery a certain number of shares and bonds. The shares are paid off at par: but the holder receives, in lieu, a share *de jouissance*, which entitles him, at all times during the concession, to receive his dividend like any other proprietor; excepting only, that 5 per cent. is first paid as interest on the shares not drawn, before the partition for dividend takes place. The bonds, when drawn, are paid off, with a bonus of from 25 to 40 per cent.

“These needful corrections of the nominal returns being made, the final result will be, that the true scale of French railway profits is not, indeed, so high as the dividends would represent; but that, as compared with ours, the actual ratio of profit to expenditure is still in their favour. This, alone, is the material circumstance which enables them to enhance

the income of the shareholder by the very means which, on our side, only tend to diminish it. In the one case, borrowing may be dictated by prudence; in the other, it must be excused by necessity.

“Proceeding to a comparison of the cost of French and English railways, it will be seen that we exhibit a very unfavourable picture as contrasted with our neighbours. For our 13,111 miles of railways, granted by Parliament, provision has been made for £377,760,000, which is equal to £28,800 per mile; but it appears from a recent return, that 2,845 miles have been abandoned, by allowing the powers of construction to expire, and the capital is thus reduced to £336,684,155, which, for 10,626 miles, gives £31,690 per mile. The French railways, as we have seen, have been estimated to cost £24,688 per mile. We have, however, probably passed the maximum of expenditure; and, profiting by experience, are now constructing railways at a much less rate per mile than formerly; whilst in France they have, perhaps, not yet reached the culminating point. I find that, between the years 1841 and 1854, the cost has gradually increased from £18,600 to £26,664 per mile; and since many of the lines are but recently opened, and others not yet completed, there is, as I have said, reason to believe that the maximum actual cost is not yet reached.”

To the disadvantage of the French are to be set down dearness of coke and iron, and inferiority of mechanical labour. The builders of French engines

are paid for them by weight, and therefore contrive to make them as heavy as possible. The excessive pressure tears up the way and wears the rails. Though engines lighter by several tons are now performing as much work as their heavier competitors, there seems no sufficient check on a practice which leads to the premature destruction of the permanent way, and a heavy liability for its renewal. In masonry the French are more lavish than the English; but they rarely give sufficient flatness to the slopes of their embankments: hence the surface of their earthworks is constantly destroyed by the weather. To remedy this defect, it is their practice to pitch or pave the surface of their slopes with stones; a process by no means so economical or good as flattening the slopes, and covering them with soil, to obtain a surface of permanent vegetation.

The theoretical procedure of the French engineer, and the system of centralization of which he is the victim, is another element of disadvantage to the French system. When the engineer-in-chief of a frontier department draws up the plan of a road, bridge, or canal, says Baron Dupin, he must first send the plan to the colonel of military engineers whose direction is in the district where the proposed works have to be executed. But as there is no connection between the departmental division and that of the military station, the same colonel of engineers is frequently obliged to discuss

a plan with the engineers of the bridges and roads of two or three different departments. Now, these officers, who are perfectly independent of each other, never come to a mutual understanding: the matter is accordingly referred to Paris, where arises the conflict of different pretensions. As all works must have received the sanction of Government, and many for their construction required the Government subvention, they were constantly postponed, from the necessity of applying the funds to other more pressing demands, particularly in time of war, when money destined for the construction of a necessary bridge, or the repair of an important road, was allotted to the wants of the army and the muniments of war; while in England, by encouraging the spirit of enterprise in individuals, the Government wisely substitutes for the temporary expedient of taxation the permanent efforts of the public to supply its own wants. As some evidence of the superiority of the one system over the other, we find that from 1790 to 1805, an interval which included four years of peace and eleven of war, upwards of 1,500 miles of canals were cut in England alone; whereas, in France, not only were no great public works projected, but those which had been executed during the peaceful reigns of Louis XV. and Louis XVI. were entirely neglected; and when these channels of wealth were exhausted, trade was paralyzed, and whole districts consigned to ruin.

The difference of the English and French methods

of procedure as regards the conduct of their relative railway engineers appeared to Mr. Locke another element of disadvantage in the French system:—
“The object, common to both, of taking the utmost advantage of the ground in tracing lines, and in making them, when laid down, in the most effectual manner, is not pursued by both in the same way. With us, as you well know, the work is planned and carried through every stage by the immediate operation of the chief engineer; who searches with his own eyes the whole field of his labours; familiarizes himself, by frequent and minute inspection, with all its features; and continues, throughout the progress of his work, in close personal contact, so to speak, with every form of its material requirements. Constantly on the ground, he at once perceives whatever demands attention; of all exigencies, as they occur, he judges for himself on the spot; determining, in fact, every essential circumstance on the evidence of his own senses; seizing advantages and meeting obstacles as they present themselves to a view thoroughly conversant with the district, and instructed by the experience of similar phenomena elsewhere. To him it never occurs, in matters of the least consequence, to depend on the information of any judgment but his own; least of all, to rely on the reports of subordinates only. In short, all that is material in the business in hand is alike designed and governed by the direct agency and

actual presence, as it were, of the chief; in other words, by the person presumed to be the best qualified to devise and control them.

“The French practice, in general, may be described as the reverse of ours. What the English engineer pursues in the field, in immediate view of his object, the French engineer, in a great measure, seeks to accomplish in his study, through the medium of others. The reports of assistants, transmitted in various shapes to head quarters, classified and manipulated in a central office by the diligence of clerks,—such are the materials upon which, to a great extent, he decides on lines and sections, designs the working plans, and provides for such incidents as arise in the course of operations.

“This method is altogether unfavourable to the consummate performance of a task subject to an infinite variety of conditions, and calling, from its outset to its close, on many occasions, for the immediate action of the best judgment available. By it, indeed, the ability of the head in no small measure becomes dependent in its exercise on materials furnished by others, who, at the best, cannot be supposed equally able. Nor, indeed, in many cases, can any report, however able, supply all that is required for a thorough mastery of critical points. The experienced eye, on such occasions, sees more than any pen can describe; and elicits, by inquiries and inspection, much that would never occur from the perusal of a statement in writing. But this system

does not apply to the chief only; it descends, through all ranks, even to the lowest departments; the details, therefore, on which the chief engineer ultimately acts, really originate with subalterns of very moderate qualifications, from whom they pass, through various ascending stages, with little effectual modifications, though with various marks of control, until, at length, they reach the engineer-in-chief.

“This method, indeed, presents a show of organization which our offices do not exhibit. On paper, it is highly methodical and imposing. Copious details are amassed, and every transaction has its special document; all is minutely recorded, and easily referred to; whatever, in short, can be conveyed and classified in writing, is done in great perfection. But this will hardly be deemed an efficient substitute for the less formal, but more direct, process, by which the engineer is thrown into constant personal relation to the realities with which he has to deal, attacking them, as we have said, face to face, with the full weight of his own proper energies; doing nothing of importance at second or third hand, but directly grappling with all that is material to the success of his undertaking.

“In the same department, another peculiarity may be mentioned, which is rather incidental to the system than expressly enjoined by it; but which, in practice—as well while lines are being made as in working them when made—is apt to cause both

needless trouble and useless expenditure. Every administrative province is superintended by a Government engineer, one of the department of *Ponts et chaussées*, whose presence affects the railway system somewhat in the following manner:—He is naturally disposed to assume as much authority as he can acquire over the public works in his district; and this, in the case of railways, does not make itself felt the less that it is, in many cases, an encroachment beyond the proper limits of his office.

“By the terms of concession, indeed, the plans being settled and approved, the responsibility for their execution rests with the engineer appointed by the promoters; and the Government official—except on some particular occasions, and at the requisition of the Minister—has no positive right to interfere with the details of construction, working, or maintenance. But it often happens that he will, nevertheless, take upon himself to do so; and, as a general rule, his demands, or suggestions, although of no legal force, are submitted to. It is in the nature of such interference that its action should, in every way, be inconvenient and onerous to those whom it affects: a cause of delay and waste, whether the mandate be to undo, or to alter what has already been done, or to adopt needless extras. The official person is, of course, in no way concerned for the trouble or expense which his notions may entail on the promoters: he is mindful, chiefly, to keep himself free from all responsibility, without regard

to the consequences resulting from his orders. When it is remembered that most of the native engineers on the lines in progress belong to the *Ponts et chaussées*, from which these State inspectors also proceed—and that the country is accustomed to the pressure of official control, on nearly every point of social and industrial action—it will readily be conceived how much, under these circumstances, may be assumed and endured, beyond what is really incumbent on those who bear the cost of interference. It is proper, however, to say that, so far as concerns my own employment in France, I have no personal complaint to make on this head; having never been required to yield to unauthorized pressure from public officers, but having, on the contrary, always found sufficient support and protection, both from my own directors and from the State authorities, whenever I have found it necessary to resist undue encroachments.

“On a retrospect of the whole, some leading points will be noticed. The difference in estimated cost per mile of the lines hitherto conceded, or made in France, as compared with ours, may be taken at from £5,000 to £7,000. To this must be added, in the French promoters’ favour, the £5,000 per mile furnished by the State. If, however, from the English rate were taken the outlay solely due to disadvantages from which the French are exempt, the difference in favour of the latter, making every allowance for the more even surface of their country, would be con-

siderably reduced. In extent of lines granted, the comparison of about 7,000 miles of French with 10,000 miles of English, would not, of itself,—considering our priority in the field,—result much to the disadvantage of the former. But if the respective character of the lines be considered, there can be no doubt where the advantage decisively lies. On a glance at the map of the French lines, we find them nearly all in the nature of leading communications; each draining an important district, and free from the pressure of rivals. The result of a similar experiment here I need not describe; but it may be asserted, that the comparative advantage of the French system really consists far more in the class of lines on which its funds have been employed,—and in the assistance given in raising those funds,—than in the expense per mile at which they have been made.

“These are the two cardinal points on which the superior prosperity of that system has hitherto turned. As to the rest, without recapitulating details, it may be generally stated, that there is no special circumstance whatever, of any moment,—with the single exception of a more limited accommodation to the public,—that would explain its superiority. And that exception is, perhaps, balanced by the greater cost of working supplies; the higher passenger-tax; the 10 per cent. on a portion of the merchandise receipts; and the carriage of mails, &c., gratis. In short, whatever real circumstance of advantage

is examined, the result of the inquiry will be to arrive at one or the other of the two principal conditions above mentioned. In other words, the source of the present good fortune of French railways lies in their favourable treatment by the State. The Government of France, while strongly controlling, has also liberally fostered, this kind of enterprise; while the English Legislature, on the contrary, unable to guide, has suffered, if not encouraged, hostile, or selfish interests to encumber and pervert it."

The best railway system, therefore, would be that which combined English practice with a little less paternal authority than the French Government displays. That paternal authority is evidently not of the most disinterested character. It finds its advantage in the end at the expense of the proprietary. Nothing is wanted to the perfection of the English system but release from the dead weight of parliamentary expenses and litigation. Could Government have granted bills at a nominal expense, and only interfered to enforce uniformity of gauge and freedom from competition, there would have been little to desire. The public would have been rescued from a permanent railway tax, and eighty or a hundred millions of expenditure would have been saved to the country. Proprietaries might have had larger dividends, and the public been able to travel at two-thirds of the established fares. With a little ordinary prescience, these great results might have been secured. But with the French, similar perfection

could not have been so easily reached. The indisposition of their country to enter upon new enterprises without being allured by foreign capital and compelled by extraneous stimulants, placed them, in the outset, at a disadvantage. Their subordination of the practical to the abstract element, and their dependence on Government, must necessarily keep them from acquiring that success in the application of mechanical science to which their neighbours so easily attain, in spite of the mountains of difficulties flung in the path. Though the French system enjoys many advantages over the English, it still flourishes only as a delicate exotic. It was introduced by foreign capital and skill, nurtured by princely aid, and sheltered by State protection. Yet it remains, in all the grand features of a flourishing organization, far behind the system which shot up into spontaneous growth, was tended by two or three poor men, and which had to defeat at every turn the hostility of landowners, the machinations of rivals, and the obstructions of Government, each on every side threatening it with speedy destruction.

CHAPTER XVI.

NANTES AND CHERBOURG RAILWAY.

THE last French railway which Mr. Locke constructed, though of the least commercial importance, has furnished the theme of more animated discussion than any with which his name is connected. Louis XIV., designing Cherbourg for a naval arsenal, had instructed Vauban to construct docks there. The works, however, were not pushed forward to any extent till the reign of the first Napoleon, and were even left by him in a very unfinished state. The present Emperor, having completed the design of the two monarchs whose glory he most seeks to emulate, was anxious to connect the port with his capital, and was so fortunate as to obtain the aid of those whose political interests are supposed to be jeopardized by its completion. The French animus against England may be very strong in the *café*; it does not, however, appear on the Bourse; for French capitalists were very chary in aiding their Government to turn Cherbourg to account until they were associated in the attempt with their perfidious neighbours.

The Paris, Nantes, and Cherbourg Railway was undertaken by a private company upon a guarantee from the Government to ensure 4 per cent.

upon the capital expended in its construction. The towns were few upon the northern part of the line, and of the poorest character. The trade of Cherbourg is nothing in comparison with that of Havre; it is chiefly a coasting trade, with an export of apples and eggs to England. Hence in a commercial point of view the line was certain to entail a dead loss. But it was of the greatest importance for the military need of France that a line of railway communication should be opened between its capital and one of its leading ports, and it therefore spontaneously held out allurements to induce a private company to undertake its execution. The president of the company was Count Chasseloup Laubat; but the directors were partly English, and at least one half of the money absorbed in its construction was advanced by English capitalists. The English interest was so strong in its direction as to succeed in retaining Mr. Locke as principal engineer. English labour was also, to a great extent, employed upon it. The cry raised by many of the English newspapers, that Cherbourg was originally planned and designedly executed as a menace to England, did not hinder Englishmen from embarking their purses and their muscles in making this naval stronghold effective by connecting it with the leading lines of railway communication in France; any more than the same cry stopped ministers from advising the Queen to accept the invitation of the Emperor to be present at the opening. Trading capital is not very patriotic,

but follows the laws of profit and loss without any regard to political speculation.

The railway, in its origin, was an isolated concern, but when completed as far as Caen, a general fusion took place, and it became amalgamated with the network of lines running to Havre, Rouen, and Dieppe, which assumed the name of the "Compagnie de l'Ouest." A struggle was then made by the French part of the direction to substitute for Mr. Locke one of their own countrymen as engineer "en chef;" but the Emperor, thinking doubtless it would tend to allay the asperity with which a large section of the English public regarded Cherbourg, if the railway to the fort was executed under the auspices of an eminent English engineer, exerted his influence to retain Mr. Locke at his post. He urged the ungraciousness of getting rid of the services and opposing the wishes of men who had made railways profitable in France. It is another proof of the strength of the French executive that he did not urge in vain.

The conditions of formation required the line to be finished first to Caen, and this portion was opened in 1855; but the final part was not completed until 1857. While inspecting an important tunnel on the line, Mr. Locke met with a severe accident. The scaffolding upon which he stood with Mr. Brassey, the contractor, and Mr. William Locke, his resident-engineer, gave way, and the party, with their attendants holding torches, were precipitated

below. Mr. Locke lighted on his feet ; but a beam struck him below the knee, causing double fracture. He was taken to Rouen and subsequently to Paris, where the most skilful surgeons strongly advised him to undergo amputation. But Mr. Locke, with his characteristic firmness, rejected their councils, and insisted upon an English surgeon being sent for. By keeping a stream of cold water perpetually playing upon the peccant part, and by the skilful use of anodynes, the learned conclave at last set the engineer on his legs again without any use of the knife. His active mind always requiring food, he employed his convalescence principally in novel-reading. The full tide of health quickly returned, and he appeared at the opening of the railway as if nothing had happened.

The Caen and Cherbourg line traverses a picturesque country, full of historical associations. Branching from the Rouen line at Nantes, it follows the slope of the valley of the Seine to the Breval summit, passing through the tunnel, 800 mètres long, in which Mr. Locke met with his severe mishap. After the tunnel, there is a descent into the valley of the Eure, which the line traverses for some miles, crossing the river of that name, and on, through a long, deep cutting, to the ancient episcopal town of Evreux, through the valley of the Iton, and, by a short tunnel, under the picturesque little town of Couches. The valley of the Risle is next crossed by a light and elegant

viaduct. It is a pleasant drive through these smiling and thriving Norman valleys, the scenery of which, with their pasture-lands (the richest in France) and spacious apple-orchards, reminds one somewhat of that of Gloucestershire and Herefordshire. Bernay is the next town of any importance on the line, and has a convenient station close to its boulevards; whence the line proceeds, still through rich valleys, to Lisieux, a very old town, formerly a bishopric, pillaged and burnt alternately by Normans and by Britons some eight or ten centuries ago, and close to which is M. Guizot's country retreat of Val Richer. After Lisieux, the railway ascends to the fifth summit, that of Lamotte, where it passes through a tunnel 2,500 mètres long, encountering a gradient of 1 in 100. At the station of Mezidon, in the district known as Vallée d'Ange, branches from the line run to Le Mans and Tours, and thence the Cherbourg Railway runs direct to Caen, the former capital of Lower Normandy, crossing three of the main streets of the town, passing through a deep cutting in the rock, and emerging in the valley of the Orne, the river of that name being crossed by a light iron bridge, 44 mètres long, in one span. The road is tolerably direct as far as Bayeux, the station of which place commands a fine view of the town and its very ancient cathedral. At Bayeux, the birthplace of Marshal Coigny, is preserved the famous Bayeux tapestry on which Queen Matilda delineated the conquest of England by her husband William. For some distance after this town

the line offers no very remarkable features. The Aure and the Drome rivers are crossed ; and at Lison a new line branches off to St. Lo, chief town of the department of the Manche. In the neighbourhood of the Carentan were encountered some of the chief difficulties presented by the line between Caen and Cherbourg. There is some prairie ground, very soft and spongy, requiring embankments, the weight of which caused the surface to yield, in many places swallowing up the superimposed earth. In the Cotentin valley, the depth from the surface of these marshy meadows to the really solid ground varies from seven to as much as twenty-two mètres. After Valognes, another of the old Norman towns which had the honour of being besieged and taken by Duguesclin, and afterwards by the English, the country becomes wilder and less level, and considerable earth-works are met with, and cuttings through hard rock, works which were performed with remarkable rapidity.

The length of the line from Caen to Cherbourg is 131 kilomètres ; but no line in France, in proportion to its length, has presented greater difficulties. As it runs parallel to the sea-coast, it crosses the chief rivers and valleys, necessitating continual viaducts and cuttings, and a great variety of gradients. The measurement of the excavations and embankments on the line amounts to 20,000,000 of cubic yards. There are 70 bridges across rivers, and 310 roads are carried across it by arched viaducts. The locomotives employed are of more than ordinary

power, to surmount the many steep inclines of the road. There are 31 stations, with all their accessories. The railroad is carried on to the *enceinte* of the fort by a short road skirting the town, over a level fringed by the retiring sea, so that the line terminates in the arsenal.

The Cherbourg station in the town was the scene of the inauguration. It had been carefully prepared both to accommodate the immense number of spectators, and to make it the theatre of a brilliant scenic display worthy of the illustrious monarchs who were to honour it with their presence. As usual, too, it was not till the last minute that all the preparations were completed: the final touches were given only a few minutes before the imperial train arrived.

Railroad depôts, for obvious reasons, are generally found in wide dead levels, avoiding what would be called romantic spots; but the station of Cherbourg has been erected near the buildings of the town, in a locality which it may be presumed is convenient, and which has the additional advantage of being strikingly beautiful. From the yard itself, almost from the platform, rises abruptly the rocky face of the mountain of La Roule, crowned by the fort. If its walls were only old and ruinous, it is perched as high, with as steep and bare a declivity from it, as any castle of the Rhine. Unfortunately it is white and solid, very straight-lined, and promises not to be dilapidated enough for sketchers for centuries to come. But as

to position, the Rhine sweeping past the foot of the Drachenfels is to that rock and ruin what the level lines of iron are to the cliff and fort of La Roule. On the opening it was considered only as a part of the scene; as a decoration it was perfect, shutting in a brilliant picture, with a grand background. The open building of the station fronts the mountain, and the trains start from the platform to be lost at the end of a few hundred yards, in the turn of the valley. But for two days previous to the inauguration, engines and carriages had been transferred to a remote siding, and space between the station and the cliff had been abandoned to a host of carpenters. To the right and left of the building, two large estrades, or galleries of rising seats, curving in immense semicircles, were erected between them; a floor of planking was laid down, leaving only two lines of rail visible, and in the usual working condition, one on each side. At the back of the station was another rising gallery for spectators. In front of this inner estrade was a large open space, occupied by a dais, in the centre of which was placed an altar supporting a silver crucifix with wax tapers and flowers. All this was bare woodwork up to a few hours before the celebration, though the decorators had for some days been busy with walls and roof. The latter was hung with festoons, and garlands of green, with depending banners, not too large; some merely ornamental and fanciful, others bearing the Imperial crown and ciphers. The flags at the sides were not spread flat, like a ship's sails

shaken out to dry, but disposed in fascies, the staves sloping at angles, and the colours drooping gracefully from them. A grand bouquet of such standards so disposed filled up, to the eye at least, the back of the building. Plants and shrubs were placed at the doorways and along the walls, so that the general effect was something like a large grove of verdure, with the gay colours of the flags as the flowers. The great merit of the whole decoration was its not being overdone. It was light and elegant, the work of those who make taste in such things a profession, and succeed in it. Along both the exterior semicircular galleries, and all the approaches of the station, were the same lines of garlands and masts, with a cluster of flags at mid-height, surmounted by some national standard. English, Spanish, Turkish, American, and many others,—all countries were represented. The whole scene was as cosmopolitan as an international fête. Every nation was supposed to have a particular interest in seeing France on her legs again; though it is very questionable whether every nation was expected to derive a salutary fear from the spectacle, or to congratulate each other, on account of the network of interests generated by commercial railroads, that France might lay down military ones without causing the slightest alarm to Europe.

The afternoon sun was brilliant and scorching, and as only the upper seats were covered in with awnings, the part of the spectators to whom custom forbids parasols were soon in a condition that nearly

approached baking. There was a long interval of expectation beguiled by watching the tapissiers covering the large central platform—the last operation—and concluded just in time. Placing the military guards along the line and marching men up and down it, helped to lighten the period of waiting. There were groups of spectators on Mount La Roule, gathered on the slopes and terraced roads, so diminished in size by distance that they looked mere specks and dots of life upon the background of a picture. What took them there it would be very difficult to make out, unless they were paid for going to increase the effect of the scene. For they could not see much themselves, and escaped the attention of others. The tedious moments of suspense were enlivened by the arrival of the clergy and magistracy, who took up their position on the right of the dais with all the formality of the supernumeraries of a theatre. The Bishop of Coutances in his glittering dalmatique, with the cross, mitre, and crosier marshalling his way, seemed to have emerged from the tomb in order to connect the meeting of the two monarchs on the Field of the Cloth of Gold with the meeting of their modern representatives on the field of iron. In a few minutes the whistle of an approaching train was heard; presently a roll of drums from a point down the line, but out of sight; then the military band near the station sang out the eternal “*Partant pour la Syrie*,” the guard presented arms, and the Imperial train arrived, gliding slowly up on one of the side

lines left uncovered by the flooring. Their Majesties alighted on this central platform; consequently the train of carriages was exactly between half of the outside spectators and the Imperial party. The Emperor and the Empress walked up the platform towards the dais, but those on the wrong side of the carriages saw nothing of them save a glimpse through the open door of a baggage-waggon. This was a blank disappointment to one half of the assemblage; and a storm of voices called out to the drivers to back the train; but it was too late. As the obstacle moved away, it discovered his Majesty listening to a short address from the chief of the judicial body—a few words only.

The ceremony of blessing the engines is curious to consider, as exhibiting the lavish prodigality with which the Church bestows her patronage, not with more earnestness upon the things which promote her empire than upon the elements of fate which tend to diminish it. The bishop intoned the prayer, and the priests in attendance repeated the responses with as much zeal as if they had been presiding at the reception of a rich heiress who had abandoned the world to enrich the sanctuary with the bloom of virgin youth and the wealth of rare possessions. At the close of the prayer the Bishop descended the steps of the dais, towards two engines gaily dressed with wreaths and flags, that had been brought up to the end of the lines, one on each side, and sprinkled them and pronounced the bene-

diction. Their Majesties viewed the ceremony from the left side of the altar, for the Church, even in those days of her weakness, will not compliment away her privileges even to absolute emperors, but persists in remaining the lord of her own domain. The Emperor having received a few sentences of congratulation from the prelate, retired to a reception-room, fitted up from one of the side apartments, in the most gorgeous style, with green velvet hangings, and a throne and canopy of purple velvet studded with golden bees. Here the chief officials of the city were presented to him: they merely bowed and passed on; there were no addresses. If the French are not so reticent as the English, they are not so much addicted as their Saxon neighbours to bore their monarchs with tedious loquacity. When French corporations do speak on public receptions, it is with a Spartan brevity which oddly contrasts with their social diffuseness. We, on the other hand, think we cannot be sparing enough of our speech in the social circle, or prolix enough at the foot of the throne. On the first occasion of Cherbourg meeting its master, silence was thought the best medium of conveying the congratulations of the municipality on the auspicious nature of the event. The Maire and the Emperor merely nodded their respects to each other, and like actors in a scene little less substantial, appeared glad to have the ceremony over as soon as possible.

The Imperial cortège, smothered in a cloud of

cavalry, then passed through the principal streets to the marine prefecture, which it had no sooner entered than the sound of a salute from the ships-of-war in the bay announced the arrival of the Queen in the *Victoria and Albert* yacht, which, with the naval escort conveying at least one-fourth of the English Commons, came in at half-past six. The wind blew from the town seaward, and the sound of the guns was not great, but the volume of smoke was immense; there was a general rush from the streets to the jetty and the Quai Napoléon, as this salute, it was expected, would be something more than usually grand. The Emperor, at eight o'clock, went on board the royal yacht to visit Her Majesty. The Queen the next day landed to breakfast with the Emperor and Empress at the Prefecture, and made a tour of the town, and visited the railway and the military port. During the evening, in an assembly graced by the presence of the English ambassador, and the Count and Countess of Walewski, the Emperor conferred on Mr. Locke the Cross of Officer of the Legion of Honour. This distinction is more noteworthy from the fact that Mr. Locke was by no means a eulogist of the Emperor, and did not shrink from letting everybody know his hostility to a *régime* which crushed the mind of France. Napoleon, therefore, in decorating Mr. Locke, may be said to have honoured an opponent for the services he had conferred on his country. Mr. W. Locke, the principal acting engineer, was at the same time made a Chevalier of

the Legion. Mr. Brassey, the contractor, had been previously decorated.

The French distinctions had been well merited. They conferred honour both upon the giver and the recipients. It was the crowning of that commercial alliance between the two nations, upon which their political alliance so much depends. Over a country redolent with associations of Saxon conquest and Norman defeat; through Caen, where William lies buried; and Bayeux, where the tapestry rudely pictures his easy triumphs,—a road had been driven by English engineers and contractors, which represented a triumph of a far different character. Upon those fields where their ancestors had contended for territorial conquest, the two nations had met to overcome nature, and make her submit to their mutual interests and necessities. That conflict with the soil had resulted in success and victory, and a French emperor bestowed his guerdons upon the men whose ancestors had formerly won the country for others, but who now had performed the nobler task of teaching his subjects to conquer the country for themselves.

CHAPTER XVII.

HONITON.

IT had, since the undertaking of the South-Western, been one of the pet schemes of Mr. Locke to continue the line from Salisbury to the junction, at Yeovil, of the Great Western, as also to Bristol and Exeter. In 1847 he bought the manor of Honiton, one of the towns through which the projected railway was to run, and was shortly after sent to Parliament by that borough. Owing, however, to the strenuous opposition of the Great Western Company, it was not till 1854 that he could get the Act for the projected line incorporated by Parliament. The capital of half a million had been for some time raised for its execution. But that was a very small portion of the difficulty, as more than thirty times that amount had been spent by the South-Western in struggling against the Great Western for a parliamentary sanction. The difficulties which natural obstacles and human timidity threw in the engineer's path were a mere flea-bite in comparison with those presented by legal casuistry and parliamentary interference. The time guaranteed for the completion of the works expired in 1858. But the full extent of the line was not opened until June, 1860, a few months before

Mr. Locke's death. The completion of the railway must have been to him a source of great gratification, and was an appropriate termination to a very arduous career. For by the completion of the line he conferred a lasting benefit on his constituents at Honiton; and paved the way for connecting Exeter and Bristol with the narrow-gauge railways of the North, upon which he had set his heart. There was, however, one alloy to this pleasure. To achieve this purpose, the mixed gauge had to be laid down between Bristol, Exeter, and Yeovil; and that mixed gauge not only materially increased the expenses of the company, but was attended with increased risk to the lives of his fellow-subjects.

Honiton, situated about sixteen miles north-east of Exeter, in a picturesque and fertile vale on the south side of the river Otter, possesses claims to high antiquity. It took its rise from a Roman settlement at Hemburg Fort, contiguous to the present town; and in the immediate neighbourhood are traces of intrenched camps supposed to have been the *Moridanum* of Antoninus. In the reign of Edward III. Lord Grey quartered his forces at this place, the evening before he defeated the Cornish rebels at Fenny Bridge. During the civil war, Charles I., who passed and repassed through the town, slept at a house still standing, which had been given by Queen Elizabeth to her physician, Dr. Oxwood, for rescuing her favourite, the Earl of Essex, from a dangerous illness, and for leaving to her the honour of signing

his death-warrant. The town was also subsequently visited by the parliamentary general Fairfax, after his successful campaigns in the West of England, in 1645. The incidents of war have been diversified with the calamities of fire. In 1747, and again in 1765, not to mention many minor conflagrations, Honiton was summoned to play the part of the phoenix. On the last occasion some 120 houses, with a portion of the church, were burnt down; yet in a few months she arose with fresh vigour from her ashes.

The town returned members to Parliament so early as the reign of Edward I.; but two or three reigns later down we find the elective franchise of Honiton suspended. Both Tudor and Plantagenet appear to have exercised their discretion as to what towns should be represented in their estates. As boroughs in those days were obliged to defray the expenses of their members, the function was regarded as a burden to be shunned, and not as an honour to be courted. But Charles I., in his contentions with the Commons, thinking he could rely on his faithful Honiton to return him two courtiers to neutralize the influence of the Hampdens and the Pym, issued his writ; and since that date—the sixteenth of his reign—the town has regularly exercised its privilege of being represented in Parliament. The town appears, in its early political predilections, to have had an eye to the main chance. Its fortunes depended upon the demand

for costly lace, of which it was the chief emporium, and in the manufacture of which it threw even Brussels into the shade. Some of the finer quality reached so extravagant a price as five guineas a yard. It was evident, if the Puritan party came in, their interests as expensive lace-makers would be jeopardized. What could embroidery manufacturers do with a Quaker England? They must starve with the morris-dancers, with the show-people, and the actors. Hence the good burghers of Honiton threw in their lot with the Cavaliers, who never thought they could buy lace enough to trim their own dresses or to decorate those of their courtly wives or fastidious daughters. Honiton owes its political franchises to the ornamental quality of its commerce.

Mr. Locke sat for the borough of Honiton without interruption till his death. He had to go through the ordeal of an election five times during the thirteen years of his parliamentary experience. But what was a torture to others, only appeared a pastime to him. The election simply consisted in the interchange of a few plain rough words from a wooden platform, a tawdry procession with streaming banners, and a dinner at the Red Lion or the George. Twice only was there a contest; and then the struggle was not so much to oust Mr. Locke as his colleague. He was on each occasion secure at the head of the poll. Mr. Locke could always rely on the support of three-fourths of the inhabitants. It was not only his vested interest in the place, nor

yet the fact of the future prosperity of Honiton depending on the borough being brought into connection, by the line to Falmouth, with the railways of the United Kingdom, which bound the electors to him. He won their hearts, and he retained them to the last.

An election in a large borough ordinarily passes off with a remarkable amount of nonchalance. In a small borough an idea is generally prevalent that upon the decision which it makes not only depends the continuance of the prosperity of the country, but the very safety of the throne itself. Honiton had not 300 electors, yet each gave his vote with that air of importance, and required as much solicitation about giving it, as if the existence of the constitution depended on the result. Mr. Locke humoured this strange weakness. He talked to them about the honour of representing so important a constituency, as if it was the last dignity that man could aspire to. He explained his political views, and entered into high reasons of state with the tanners and shoemakers who assembled to hear him, as if they had been an assembly of legists and political economists. And we have very little doubt that this was the right path to pursue. Mr. Locke, by talking to his constituency in their own familiar language about things they could never understand, became immensely popular. His proposer said he was equal to twenty Dukes of Wellington. The compliments were reciprocal. Mr. Locke treated Honiton as the

first constituency in the kingdom, and they treated Mr. Locke as the first public man.

There was, however, one occasion on which this harmony of feeling was in danger of being disturbed. Cardinal Wiseman had just sounded the ecclesiastical trumpet from the Flaminian gate into the ears of the English people, at a season when the press of England had nothing else to do than repeat its echoes. Every editor, turning himself into a species of Erinnys, converted the pastoral into a torch, and waved aloft the brand of religious discord. Had the French fleet appeared off the coast of Dover with certain belligerent intentions, while our war steamers were off on a cruise, the impression produced in the country could not have been more thrilling. It was imagined that a convoy of mitred Pandulphs was about to anchor in our harbours; and that these sacred gentlemen had come to levy taxes in the queen's name, to dominate over the spiritual courts, and to absolve one-third of the empire from its allegiance. Under such circumstances, and in such times, the most innocent are often those chosen by popular suspicion. It was insinuated by Mr. Locke's electioneering enemies that he was one of the arch conspirators who, under the guise of a railway engineer, wished to get into the House of Commons in order to ruin his country. Mr. Locke did not attempt to reason with this sort of insanity. He took it for granted that the attempt of the Vatican to readjust the frontiers of the old dioceses, which

it had mapped out some centuries ago, was as atrocious and as diabolical an interference with English laws and usages as any Clapham old lady could make out. As such he denounced the conduct of the Vatican as an unprovoked attack upon the liberties of Englishmen. But he averred that if any section of his countrymen ought to be blamed for bringing this wickedness upon the nation, it was the High Church party, who formed the very citadel of Conservatism. The men who brought the charge against him were those whose practices had principally encouraged the aggression denounced. But Mr. Locke confessed his readiness to assist any minister who would vindicate the outraged honour of the country.

The charge was hypocritically brought, and most dexterously defended. His opponents had hurled at him a ponderous missile, which rebounded from his armour without doing him any mischief; but instead of taking it to pieces, and showing the materials of which it was composed, he shot it back among his enemies with destructive effect. Mr. Locke doubtless condemned the policy of the Vatican, but he thought it perfectly harmless.

Mr. Locke went in upon the Liberal interest. His political programme was short; retrenchment in public expenditure, civil and religious liberty, extension of the franchise, and reform of obsolete institutions. But that programme meant a great deal, and from it he never swerved. Mr. Locke was not so reckless a partisan as to refuse good measures even

when emanating from his political opponents. He looked upon party as an organization for the sake of calling into practice certain political principles, and not upon principles as a means of carrying into office a political party. Hence he supported the Reform Bill of the Conservative administration. In explaining his conduct to his constituents he drew a distinction which is often lost sight of, but which is worthy to be noted. "There were cabinets," he said, "who passed good measures from expediency and others from principle. Now, he would prefer to have liberal measures from those who had an interior conviction of their worth; who accepted the principles of liberalism as a doctrine; but he was not going to reject liberal measures when offered by men who adopted them from motives of expediency, since he very clearly saw if he did not get them from that quarter he was not likely, in the present position of party, to get them at all." But whether likely to get them or not, we believe Mr. Locke's course was the only one which a sound independent political thinker could have pursued. It was the course adopted by the Liberal party in the case of Sir Robert Peel's fiscal measures. They acted on the principle of the creditor who, when he cannot get the whole, is glad to receive an instalment of his account. Opposition on other terms would be factious; no opportunity would be allowed for political conversion. It is also politic, even as regards the mere tactics of party, to help opponents to stultify their principles by passing measures

at war with their past professions. For by this policy they are rendered ridiculous in the eyes of the country, and made the instruments of their own degradation.

Poor Honiton, in returning two members of the Liberal party and being desirous that they should march in the van of Reform, hardly seemed to think she was taking part in a movement which threatened her with political extinction. The Reform Bills of Lord John Russell would have deprived the borough of the privilege of returning two members; while the larger schemes of the Radical party, to whom Mr. Locke was allied, would have deprived her of senatorial influence altogether. Mr. Locke really advocated a Reform Bill which would have flung him out of his seat, and Honiton loved to be talked to about the progress of a measure which would have consigned her political honours to the tomb of the Capulets. Committees sat and meetings were organized to bring about this consummation; and as the precipice was neared, a shout of delight was raised, as if some extraordinary good fortune to the town awaited the issue. Truly both evinced a self-sacrificing spirit, an heroic devotion to the interests of the country, which is hardly paralleled by Curtius leaping into the gulf to save the Capitol.

Yet had the upholders of small constituencies required an addition to their stock arguments, they might have drawn their best from the case of Honiton, and truthfully maintained that it was not an in-

stance which stood alone. The most determined stickler for carrying into practice the principle of representation could not have denied that Honiton sent to Parliament an essentially representative man. There was no great centre of industry, no large town which wealth had rendered important, no mercantile community in the kingdom, whose wants Mr. Locke did not comprehend, and with whose objects his own were not directly associated. But he was not a local man anywhere, or in any sense; and he was too independent a man to woo any constituency at the sacrifice of his own opinions. Hence it is very doubtful whether he could ever have been returned for any of the large boroughs, whose activity his career had been so instrumental in promoting. He was wise in preferring the security and independence which boroughs denominated "rotten" confer. Nor can we convince ourselves that the Legislature will act wisely in destroying them, till it have discovered some more satisfactory refuge for men who refuse to be the mere delegates of their respective constituencies.

CHAPTER XVIII.

SUNDAY VERSUS SABBATH.

IN the construction of the Scotch railways nothing confronted Mr. Locke so frequently or annoyed him so much as the intrusion of the theological element in the brick-and-mortar undertaking of contractors. It also met him at the managing boards and at the public meetings of the proprietary. Directors threatened to retire unless some specific engagement was entered into that no trains should run on Sunday. Shareholders refused to continue their interest in the line unless the navy was hindered from handling the spade on Sunday. "Respect the Lord's day," became the shibboleth of railway parties north of the Tweed. One director affirmed that the man who would violate the Sabbath would have no difficulty in eloping with his host's wife, and even stealing his spoons. Managing boards were told by their proprietary that the only way to secure a good dividend was to insure the suspension of every sort of work one day out of seven. No companies could expect to prosper, which acted upon any other principle. Hence they were conjured to consider any one who regarded with toleration the slightest infraction of the sacred obligation of com-

plete rest on Sunday, as a person who, if allowed to continue in the company, would soon involve them in irretrievable bankruptcy. Such a man was to be cast overboard like Jonas, in order to insure safety to the struggling ship. It need hardly be said that Mr. Locke was at war with all this theological fervour; and that if their conduct had been in harmony with their professions, they would have been obliged to sacrifice their undertakings by making their pilot the first victim. Though often impeded in his Scotch projects by the agitation of these harebrained enthusiasts, who sought to render Sunday agreeable to God by making it unpleasant to man; and though regarding their notions as monstrous as any that could be found among the theological barbarisms of the South Sea, he nevertheless condescended to humour them, just as an enlightened European would humour a band of Caribbean savages, in whose power he might happen to be, conscious that the time would come in which he would have his triumph.

It was Mr. Locke's destiny to put in his first Parliamentary appearance in connection with the Sabbath question. There were in 1849 sixteen railways in Scotland, in full operation, running over a distance of about 500 miles with the Sunday management. To eight of these no objection could be taken. Trains were run, out of divine service, at intervals sufficiently frequent to meet the requirements of the public. But with the other half there was either a complete suspension of trains during the canonical twenty-four

hours, or where the companies were compelled to carry her Majesty's mails, they refused to yoke passenger trains to the teams or allow any travelling, even in cases of extreme emergency. The Duchess of Sutherland having received a telegram that her father was lying in extreme danger at Castle Howard, posted to Perth to catch the mail leaving that place for Carlisle on Sunday evening. The company refused her request, and her noble parent in consequence died unattended by one who would have assuaged his final sufferings. A duchess, screaming out in vain on a railway platform to be allowed to close the eyes of a dying parent, drew the attention of Parliament to the nuisance which a hundred previous cases quite as outrageous failed to effect. It was felt that as railways had got into their hands a monopoly of the channels of communication by the sanction of Parliament, they ought not to be allowed to use that power for the special inconvenience of the public; that, having absorbed all other modes of travelling, it was their duty to provide means of transit as ample as the public necessities required. Mr. Locke, determined to pay off his old scores with the Sabbatarian directors of Scotch railways, took up the subject. Having first ascertained, by questioning the Treasury bench, that the administration of Lord John Russell did not intend to move in the matter, he obtained leave on the 3rd of April to bring in a bill to compel the Scotch companies, under a penalty of £200, to yoke passenger carriages to the usual trains on

Sundays, as was the custom during the rest of the week.

In moving the second reading of the Bill, Mr. Locke observed that in "ordinary circumstances he might have placed the Bill on the table, and appealed to the common sense of the House in support of it, as a measure that simply proposed to attach a few passenger carriages to the mail trains that were already running on Sundays under the authority of the law; but the character of the opposition, as evinced by the petitions laid on the table, was such as to induce him to offer a few observations in reference to the objections urged to Sunday travelling. He asked the House to bear in mind that it was not contemplated by the Bill to enforce the running of any additional trains whatever, but only to oblige railway companies to attach passenger carriages to those trains they were already compelled to run for Post-office services. By the Act 1 & 2 Vict. c. 91, the Postmaster-General was authorized, on any day, and at any hour, to require railways to carry mail trains; there were companies that had voluntarily attached passenger carriages on Sundays to those trains, and even increased the number of trains; whilst, on the other hand, there were companies that refused to attach such passenger carriages, and there were others again who, not having been required to carry the mails, had closed their railways altogether on Sundays. This want of uniformity had led to serious inconveniences; and as he was persuaded Parliament never intended to

permit railway companies to determine on what days they might altogether prevent the public from availing themselves of railway communication, he had felt it to be his duty to bring the subject before the House. The cases of individual hardship and annoyance were numerous; but he would only refer to a few. One of them was already too well known to the House and the country—the melancholy case of the Duchess of Sutherland. That noble lady posted on Sunday morning to Perth, having despatched a messenger the day before to secure a place in the mail train for Carlisle, near which her parent was lying dangerously ill. The regulations of the company did not admit the public to travel on Sunday; and, notwithstanding the entreaties of this afflicted lady, she was refused a place, the train was despatched without her, and she was left in the deepest distress weeping on the platform. The Duchess was compelled to proceed through Fife, sending messengers to order posthorses and to prepare a special steam-ferry, in order to reach Edinburgh and arrive at some other railway where less stringent rules were adopted. He would add nothing to this recital. The Sabbath Alliance had its triumph; but he regretted that their victim should have been a woman in the discharge of a duty so sacred as ought to have secured for her universal sympathy. On the same day a gentleman who had posted a long distance, from the Highlands, was disappointed in not getting the evening mail, though he had most important business in London. At the time of the October

tryste at Falkirk, a number of cattle-dealers arrived from the south by the Caledonian Railway at Greenhill, the junction with the Scottish Central, and they were obliged to turn out and find their way through the moors as they best could. This was precisely what happened to all persons going north on Sunday, excepting those who, by means of a bribe, seduced the company's servants to allow them to ride in the guard's van. This had been often done, and he mentioned it to show the consequences of attempting to impose unreasonable restrictions on the fair and ordinary requirements of life. There was another case of an eminent medical practitioner in Glasgow, upon the celerity of whose movements life and death depended. Late on a Saturday night he was taken by a special train to Morningside, to see a lady who had been hurt by the overturning of a carriage. In returning, the engine-driver stopped on reaching Holytown, and said he could go no further, as it was now Sunday morning, and it was contrary to the rules of the Garnkirk line to travel on Sunday. At Holytown, he found that no post-horses had been kept since the opening of the railway, and it was only after some delay and difficulty that he succeeded in getting a person to convey him to Glasgow in a gig. On another occasion, the same practitioner had to visit a gentleman, who had typhus fever, near Greenock. When he saw him on Saturday, the patient lay in a precarious state, but a Sunday visit was impossible, both the river and the railway being

closed on that day, and before he could reach by the first train on Monday, he found on his arrival at Greenock that the patient had died on the Sunday forenoon.

“The next case was that of an hon. member of that House, who posted one Sunday to Dumfries, in the expectation of getting a train to bring him to town, to enable him to vote in the House on Monday evening. On reaching Dumfries, he found that no train left on Sunday, and he had to hire a carriage to reach the Caledonian line at the nearest point. The postilion who drove the hon. member, said he hoped he was going to oppose this wicked bill, that would enforce railway travelling on Sunday; and on his being asked why he wished so, his reply was, Sunday was the only day on which they had any work at all. He trusted the hon. member, who was a Scotchman, would record his vote in favour of this Bill.”

After adducing enough to show the hardship and inconvenience now experienced by the want of railway accommodation on Sunday, Mr. Locke proceeded to show that that accommodation could properly be given. “Every line on which mail trains were run, required as much superintendence as if passenger carriages were attached. Every gatekeeper, pointsman, policeman, or switchman, must be in attendance on a train whether it contained passengers or not, and the locomotive superintendence was equally essential. The agents at the stations, and who gene-

rally resided there, must attend personally or by deputy, to see that the mail-trains were regularly despatched, and these persons could deliver their tickets to passengers, so that few, if any more, persons would be required to attend to a passenger train than were requisite for the mail-trains now running. In order to inform the House thoroughly on this point, he would give a statement of the actual number of men employed on the Caledonian Railway, distinguishing the number employed for the special service of the Post-office, and those required for the mail and passengers together. There were thirty-two station agents required for the post-office accommodation, and forty-two for passenger accommodation; but, in respect of guards, engineers, firemen, cleaners, and watchmen, the numbers required in either case were the same—so that the addition required for passengers amounted only to ten men. But he was not content to rest the question on that ground. Mail-coaches, ferries, post-horses, &c., with their train of attendants, had always been employed in Scotland on Sunday, and with a greater amount of manual labour than was now required for railway travelling; and on what principle, then, should the accommodation that Scotland had hitherto enjoyed be taken away? It was very easy to raise a clamour and denounce those who thought as he did as Sabbath desecrators; but let those who made those charges look around them at home, and see the number of private carriages and hackney cabs engaged every Sunday, and which yet excited no

observation whatever. He took the liberty of counting on Easter Sunday the number of carriages and cabs that were attending four kirks or meeting-houses in Lothian Road, Edinburgh; and there were 31 private carriages, 13 one-horse carriages, and 149 public cabs, making a total of 193 vehicles, whilst the same day five cabs only were required for the Caledonian train, on its arrival from the South. Why were these glaring inconsistencies overlooked? Was the end to justify the means, or were these rigid sticklers of conscience disposed—

“ To compound for sins they are inclined to,
By damning those they have no mind to ? ”

It would not be difficult to show that there was a greater amount of labour so employed, by tenfold, than was required to work all the lines that Scotland possessed. With great respect for railway companies, he must say that he thought the public right to travel at reasonable times should be placed in other hands than theirs. The very want of uniformity among them showed the necessity of this; but the public would find other reasons, in the mode by which the Sabbatarians sought to force their views upon the country. A circular recently issued, in relation to the Scottish Central Railway, called upon the religious to purchase shares in the company, and to use their influence with other supporters of the Sabbath to do the same without loss of time, in order to defeat a proposal about to be made in the directory to run

mail-trains with passengers on Sunday. A guarantee dividend of 7 per cent., or 35s. per £23 share, was held out as a bait, that the conveniences of the country might be overturned by the joint inroad of cupidity and fanaticism. But it might be as well to state to those people who were induced, for a religious purpose, to embark their money in this way, that they would receive guaranteed dividends quite as large from lines now running railway trains on Sunday. After the Edinburgh and Glasgow Railway was opened, the directors established morning and evening Sunday trains, and, during four years, they accommodated weekly 1,000 persons. The proprietors becoming dissatisfied with the general management, a new set of directors was called for; but it was found that this could not be effected without a union with the Sabbath Alliance party. Accordingly the union was effected. New directors came in, who closed the railway on Sunday. And thus the Sabbath party, though a small fraction of the entire proprietary, succeeded in their object, and those who obtained power had managed to reduce the dividends below what they were before."

Mr. Locke next glanced at the theological aspect of the question, observing, that "he was not satisfied with the perpetual and exclusive reference made to the Jewish law in favour of the rigid mode of observing the Sabbath insisted on by those who opposed the Bill; for, by the authority of that law, Christ himself was declared a Sabbath-breaker. He be-

lieved that rigid observance was not sustained by the early fathers of the Christian Church, nor by Luther, Melancthon, Taylor, Calvin, or Paley. In all Protestant countries abroad the practice too was at variance with Scotch Puritanism. But there was another mode of viewing this subject, which was, whether this extreme rigour in the observance of the Sabbath really accomplished the objects of the Sabbath institution. It was said that education was more generally diffused among the poorer classes of Scotland than of any other country; yet a comparison of the statistical amount of crime as between Scotland and England did not bear out the expectations which might have been formed by the higher state of education in Scotland. On referring to the returns of the year 1846, he found that the convictions in England and Wales were 1 in 876, against 1 in 848 in Scotland; while in 1847 the proportions were, in England, 1 in 738, and in Scotland, 1 in 737. If they compared the three largest counties in England with the three largest in Scotland, in which the great masses of the people were found, the result was, that in the Scotch counties the convictions were, in 1846, 1 in 602, and in the English counties 1 in 692; in 1847, 1 in 518 in the Scotch, and 1 in 598 in the English counties. The average of the two years made a difference of 14 per cent. in favour of the population of England. If the House looked to the consumption of ardent spirits in Scotland, they would find a much greater proportionate use of spirits than

in England; the average consumption in England being 0·72 gallons for each person, and in Scotland 2·32 gallons. It was perfectly true that the consumption of malt by brewers in England was greater than in Scotland; but the fact remained, that in the larger cities of Scotland a state of demoralization and crime existed which was not to be met with in the larger towns of England. Mr. Miller, Inspector of Prisons, in the Twelfth Report on Prisons, stated that one great cause of the vice and crime of Glasgow was the want of national amusements and recreation as a substitute for the corrupting and demoralizing influence of a large town. Mr. Sheriff Alison stated, before the Combination Committee of the House of Commons, that 80,000 of the working population of Glasgow never went to church, and that 10,000 persons went to bed drunk every Saturday night. He felt that this bill was called for by those who wished to put an end to the disagreeable and vexatious discussion of the question, that its principle was sanctioned by the highest Christian authorities, that it was called for by public convenience and necessity, and by the vast mass of hard-working men such as filled the city of Glasgow, and who wished, after working for six days in the week, to be permitted to visit their native homes, and to spend the Sabbath in the bosoms of their families or by the firesides of their relatives and friends. Such facilities as those which he proposed to give those parties, would teach them those higher and nobler

feelings which are inspired by the contemplation of the beautiful mountains and mighty landmarks of their native soil, and would lead them, in that contemplation, to

Look from Nature up to Nature's God."

Mr. Locke only glanced at the question of principle. As a practical man he fought the Sabbath question upon the ground of tangible realities. But no attempt, as Mr. Hume remarked, was made to grapple with his arguments. The majority of his opponents took refuge in idle generalities. Some Scotch members argued that Government had no right to interfere with private property; that though the Parliament had given them a monopoly of the means of transit for the purpose of their enlargement, yet it was perfectly competent for the railway directors to abolish or diminish those means at their discretion. But the great citadel of Sabbatarian strength lay in the shock which the proposed interference would impart to the religious convictions of the Scotch people. The Minister, Mr. Labouchere, avowed that the convictions were founded upon prejudice, yet he took his stand upon them to resist the motion. According to this gentleman's confession, he a long time hesitated what course to pursue. He had to balance in two opposing scales the inconvenience caused to a small portion of the public with the outrage that would be committed upon the religious scruples of the many.

Yet, with the opposition of the Government, Mr. Locke's motion, in a pretty full House, was only defeated by a majority of 9.

The conduct of the Government on Mr. Locke's motion laid its members open to the charge either of want of consistency in their principles or of lamentable vacillation in their conduct. Had Ministers consulted the religious scruples of those who petitioned against the measure, they would have stopped Her Majesty's mails, and suspended Sunday traffic altogether. Now, as Mr. Locke's motion simply restricted itself to the attaching a passenger carriage to the trains already in operation, the Scotch scruple of conscience lay between one carriage and two. As such, it was unworthy of the slightest consideration. Had the Scotch people, as a class, possessed such antipathy to Sunday travelling as to suspend all passenger traffic on Sunday, there might have been some show of reason for the course which Ministers pursued; but one half of the railway companies ran trains on Sundays, so that the bigotry of some companies interfered with the advantages which might have been derived from the liberality of others. Hence, what was regarded as a crime at Glasgow was perfectly innocent in the latitude of Dundee. The question for Ministers to have considered was, not whether there were any popular prejudices against the proposed measure, but whether such prejudices were founded upon reason, and how far the public interests

were likely to be damaged by their adoption. It would indeed be a cheap method of governing a country if a Cabinet were in every instance to consult some prejudices in order to silence all reasons; to flounder in the darkness which they ought to dissipate; to have no polestar but temporarily successful compromise; no wind to impel their course but the breath of the loudest faction; no compass to steer by but the dangerous mandates of theological guidance.

The principle involved in the Sunday question, though it has filled tomes, may be disposed of in a few sentences. It is a part of the natural law, as expounded by moralists, both Christian and Pagan, that man should worship his Creator. The time or the day set apart for this duty is quite extraneous to the law itself. The heathens had their festivals at regularly recurring periods; but these were mostly of political origin. The Jews had their Saturday (*Sabbatum*) set apart, according to their records, by God himself. But with the Jewish rites this practice fell to pieces, and nothing remained obligatory after Christ but the simple natural law that man should worship his Creator, the time, the place, and the manner of that worship being alike undetermined. It was the practice, however, of the apostles and their immediate successors to meet on the first day of the week to commemorate the Lord's resurrection. After the simple morning service, generally performed underground before the sun had risen, the Christians dispersed among the Pagan population, and followed

with them their habitual occupations. For the first three hundred years of Christianity, this was the custom. The habit of looking on the day as one of ritual devotion, grew up by degrees as Christianity acquired strength; but no ordinances were issued in connection with its strict observance until the fourth century. Nearly up to that time, when the world suddenly found itself Christian, the followers of Christ betook themselves to their manual labours upon the first as upon any other day in the week, simply contenting themselves with that fulfilment of the natural law which was satisfied by their private devotions, and the solitary hour on Sunday which they dedicated to their Maker. Indeed, they had little choice in the matter; for a punctilious observance of the day by the suspension of manual labour would have singled them out as Christians, exposed them to bloody persecutions, or interfered with the simple request they daily put up to their Maker of obtaining their daily bread. It was not until the Church felt itself strong in the accession of the majority of the Pagan population to her creed, that she threw her opinions upon the observance of the Sunday into a doctrinal form; and even then her ordinances in connection with the subject she did not venture to enforce herself, but left them to be issued under the warrant and seal of Constantine, the first Christian emperor. So far, therefore, the mode in which the natural part of the law shall be fulfilled is of ecclesiastical institu-

tion, and the Church, having no weight to enforce ordinances so new, committed them to the civil power. If, then, any force is to be attached to these ecclesiastical ordinances, we must consult them as they are found in the edict of Constantine, in the pages of Eusebius, and the early fathers of the Church. It will serve very little purpose to overthrow these ordinances and allow each one to consult his private feelings upon this subject, and endeavour to force the Sunday he has fashioned for himself upon his neighbour. It is pretty evident that if we do annul these ordinances we have no other authority but the natural law, whose dicta would be fulfilled quite as much by worshipping God with the Persian upon the mountain-top upon any morning in the week, and then proceeding to manual occupation, as by abstaining from manual occupation and sitting out a protracted service one day in seven.

What, then, are these ordinances, and how far did Mr. Locke's motion tally with their spirit?—for, after all, as far as principle is concerned, this is the only question involved in the issue. If there be one thing which distinguishes them it is this,—an attention to social conveniences and physical wants. Every Christian is enjoined, under pain of heavy sin, to abstain from servile work, and attend church; but no Christian is enjoined to do either, to his own great physical discomfort or his neighbour's disadvantage. The church of those days was not a harsh step-mother. Her laws did not bind *sub gravi incommodo*.

They were only applicable in cases where their practice did not conflict with national, individual, or social interests. When the Christian was obliged to work in order to comply with his own or his neighbour's necessities, she stepped in with her salvo, *Qui laborat, orat*. All work which is not servile she permitted, and even servile work, so far as such was necessary to social comforts and public recreation. The attaching of cars to a mail-train, or, indeed, any increase in the number of trains, provided they did not interfere with the church attendance of the railway officials, would have fallen in with the strictest churchman's views upon the propriety of the closest Sunday observance.

These ecclesiastical ordinances were matters of universal Christian recognition up to the seventeenth century, as they are at the present day in vogue in every Christian country, Protestant or Catholic, except our own. They prevail in Evangelical Sweden as well as in Catholic Portugal, in the canton of Berne as well as in the canton of Uri, in the mountain-fastnesses of the Waldenses as well as in the plains of Piedmont. Nor did the opposite notion of blending the rigid severity of a Judaic fast with the gaiety of a Christian festival get ground, even in this island, until a reign of political excess superinduced a reign of theological barbarism. It was only when the throne was hewn down to a block, and the monarch beheaded by express warrant from the Jewish scriptures; when a swarm of religious

zealots, drunk with fanaticism, issued from the North with the sword in one hand and the Bible in the other; when the national pulpits were filled with troopers; when the abrogated scheme of the Old Testament was accepted not merely as the divine chart to heaven, but as affording the only principles by which nations should be governed; when a crusade was preached against the most healthy English sports and the most innocent and national amusements,—then and then only were the severities of the Judaic Sabbath confounded with the Christian Sunday, and mankind obliged to keep a fête of universal rejoicing with the same austerity as if it were a day of national humiliation. But the propounders of these absurd ideas left the spawn of their theological dogmas in the minds of the people long after their political doctrines had been swept away. The mantle of their spiritual belief fell upon those who continued the war against the Church after its resurrection. And when that Church, by the development of the conflicting principles within her, had split into two opposite sections, the high-church dogmatism of the one, by the law of reaction, generated in the other the very notions of Judaic Christianity, against which the apostles thundered, and which formed the very shibboleth of the party who, in a period only recently antecedent, had involved the altar which they revered, and the throne to which they paid fealty, in one common destruction.

But error cannot be entertained without involving its supporters in a cloud of inconsistencies, and those who have inherited the opinions of the Puritans upon Sunday observances have paid the penalty in a confusion of ideas which has vitiated the whole of their political and social existence. Life to them has become a punishment, pleasure a crime, the world a bewilderment, religion a terror. Poor ghost-ridden spectres abandoning the materially beautiful in order to hunt after the spiritually deformed, crowding the future world with the hideous phantasms of their brains, which they allow to cheat them of the splendid realities of the present. Splenetic victims of shadows far more desolate than those which encountered the Greek neophyte in the cave of Trophonius, and blasted him for ever!

The opinions of the Sabbatarians set all logical sequence of thought at defiance. They cannot make their theory square with their practice. They cannot find any principle which reconciles the intermediate actions they approve with the actions they condemn. If servile work is to be altogether reprobated on Sunday, why not suspend the labour of their menials on that day? Why not discard the Sunday dinner? All that is required for a man in a state of health is a crust of bread and a glass of water. At all events, ale is not required. But it is known that malting requires eight consecutive days, so Meux and Co. brew on Sunday. The Earl of Shaftesbury draws much of his political inspirations from the

Morning Post. But its printers turn into Wellington Street every Sunday evening at six o'clock, to set up the type for the following day; and the editor makes his appearance at ten, to superintend the operation? Why should the train be stopped on the line, and the ship allowed to steer out of the harbour, and the cab to move in the street? It is evident that the question of Sunday labour is not to be decided by the absolute necessity of it, but by the amount of convenience afforded by it to the public. To be consistent with our practice, we must go back to the Edict of Constantine. We must accept the principles or practice of the early Christian Church with regard to it, as propounded by Eusebius. We must aver that the Sabbath is utterly unknown to the Christian religion; that the Christian Sunday is a human institution, set apart for sacred observances by human wisdom, for human purposes, and on human grounds.

CHAPTER XIX.

PARLIAMENTARY COUP D'ÉTAT.

IT was the last day of May, 1850. Most of the members of the House had taken self-leave and gone to Ascot. The Sabbatarians spied their opportunity, and mustered in great numbers. Lord Ashley moved, in a thin House, that the Queen be graciously requested to suspend the postal delivery in every provincial town during the Sunday, and stop the mails. The address, after a feeble opposition, was carried by a majority of twenty-five. Ministers, in order to punish their supporters for their lukewarmness, advised the Crown to accede to the request. The Cabinet had been for some time exceedingly dull, and thought they might indulge in a joke at the nation's expense. The people woke up to all the realities of a Barebones Parliament. Ashley, it was said, elated by his success, was preparing to move the "Self-denying Ordinance." Puritanism was again to find its shelter behind the throne, and the British Constitution, to walk abroad once more in strait coat, lank hair, amorphous hat, turning up the whites of its eyes to heaven.

The stoppage of Her Majesty's mails for twenty-

four hours, with the suspension of Sunday postal delivery in town and country, would, if persisted in, have deranged the commercial affairs of the country, and exposed us to the ridicule of the world. Lord Ashley's resolution would have gone very far to repeal the union, not only between England and Ireland, but between England and Scotland at the same time. The inhabitants of the three capital cities of the United Kingdom might, had the noble lord's projects been consummated, have regarded themselves as perfectly separate as the citizens of Amsterdam are from those of Berlin, or the inhabitants of St. Petersburg are from those of Vienna.

The country, after recovering from its surprise, betook itself to a remedy. Arrangements were made with most of the railway companies of the metropolis for the conveyance of parcels by the last trains on Saturday evenings, which were to be delivered at the respective stations on Sunday morning to any persons inquiring for them. Each provincial newspaper agent doing any business engaged a set of runners to discharge the commissions which the post-office officials, at one-fourth of the labour, had discharged before. Instead of the regular post-delivery got over before most of the recipients were out of bed, each town on the Sunday morning became the theatre of noisy contention between different staffs of messengers, who startled the steady church-goers, by pelting each other with petulant pasquinades. It was felt that Parlia-

ment should take up the matter. Mr. Locke brought the subject before the House on July 9, in a speech which is noted for its attention to details. He showed that Sunday labour had been increased by the absurd attempt to diminish it beyond what was required for the public wants; that the country, by Lord Ashley's resolution, had been subjected to much inconvenience, in order that Sunday quietude might be more glaringly violated; that, if the principle involved were rigidly carried out, the Sabbatarians should give up employing their servants on Sundays; no ship should be allowed to unmoor, no coast-guard man to keep watch, no policeman to tread his beat, no physician to heal on the seventh day.

The question was, therefore, resolved into one not of necessity, but public convenience. Mr. Locke proceeded to show how great was the inconvenience arising to country residents and to the poor man. But the theory required no argument. A motion which was carried by a side-wind, the House had resolved to erase from its records. It accepted of Mr. Locke's proposition without any discussion, save about two incidental alterations which were embodied in it. The Queen was invited to inquire into the public inconveniences arising from the resolution of Lord Ashley, with a view to its abrogation. Ministers took the hint, and Sunday deliveries in the country became the rule as heretofore.

There was one point which constituted the great burden of Lord Ashley's song, in moving the original

resolution, which was not even glanced at in the merely verbal discussion which took place on the subject. The noble lord argued that the country was dealing unfairly with the provincial postmen, in not allowing them the same privileges as those conceded to the London postmen. He only claimed the same Sunday rest for the country official which Parliament had already conceded to the town official. If there were no inconveniences resulting to the London merchants and bankers from the stoppage of the Sunday delivery in town, there surely could be none for the country merchant and the country banker. The noble lord only wanted to equalize what inconvenience there was in the matter, and make the House consistent in its legislation. But there was not that close parity between the two cases which Lord Ashley wanted to make out. If the mails were stopped on Sunday, the delay of letters posted on Saturday, addressed to Ireland and Scotland, would have run considerably into the middle of the ensuing week. Now there is no comparison between the anxiety which is manifested for London intelligence in the country, and the interest which is felt for country intelligence in London. The one generates the highest excitement; the other the feeblest attention. All the weekly papers of any general interest are published in the metropolis. They contain the latest foreign telegraph, the latest rumour of ministerial change or party tactics. They are, therefore, sought with the greatest avidity in the country;

while no one in London ever takes up a country paper unless he expects to find some object of local interest. It is essential for the country merchant, as well as the London merchant, to know the latest price of stocks, the last price current, how corn is selling in the market, and whether the exchanges are in favour of Amsterdam or London. Besides, the delivery of letters in a provincial town necessitates little, if any, additional labour. But in London, the same delivery would entail as much hard work in one day as is probably got through in Naples in the course of a year. Now, there was no reason, if Parliament had suspended the delivery of letters where it could be done with the least disadvantage and the saving of a mountain of labour, that it should suspend the same delivery where it would inflict the greatest injury and save no labour at all. Besides, if there was any consistency in the argument, it was evident it did not go far enough. For the country postman could not claim the same immunity from physical labour as the town postman, without the attendants at Hampton Court and Kew demanding, on the same ground of equality, to enjoy the same rest every seventh day as the attendants of the National Gallery, or of the Kensington Museum. Doubtless so much was not asked for, because it was felt a large request would frustrate the success of the little so ephemerally secured. But the hand that struck the chain off the Sunday postman, if unarrested, would have next proceeded to lock out the public from all

our national palaces and museums, and prevented the nation from enjoying those stores of nature and art which they contribute so lavishly to maintain.

The physical advantages conferred by a periodical resting-place where man can breathe freely, without being crushed in the turmoil generated by excessive commercial competition; the pleasures derived from feeling himself a rational agent, born for loftier purposes than merely to subserve the material wants of his fellow-creatures; the spiritual influences which may ennoble his being, from finding himself alone with nature for one day in seven,—these are benefits of which no class should be deprived upon slight grounds. The classic and mediæval nations had less need of such breaks in life's ordinary business than ourselves; they had little or no commerce. Existence with them was not a perpetual struggle to tread upon the heels of the crowd going before, so as to prevent the same discomfort from being inflicted by the crowd pressing behind, but rather a variegated tournament, in which the material comforts of the many, though extending over a far less range, were more amply enjoyed, more easily obtainable, and quite as fully secured. Yet they had their fêtes perpetually recurring, on which man was invited to consider himself not a spoke in a grinding-wheel, but the citizen of a spiritual universe, the most prominent link in the economy of nature. If the religious element had its place on these festivals, it was in no exclusive

sectarian spirit. It was an element of the most catholic tendencies, not trampling on the instincts of man's nature, but elevating its social and æsthetic aspects, and even imparting to them more prominence than to itself. It was not the spirit of bigotry erecting its throne upon the ruin and exacting worship at the price of everything else, but the gentle handmaid of nature only valuing itself by the benefits it conferred upon qualities seemingly opposed to itself, and never appearing save to refine the material and even the hilarious gratifications of man. We talk about the wisdom of the past, but imitate its follies; it would be well if we would discard its follies and cultivate those social gaieties and æsthetic tastes which are the theme of so much panegyric but of such little practice. But it is evident that Sunday cannot be made to discharge those functions in the social economy which are peculiarly its own, unless large sections of men be set apart to minister to the legitimate recreation of the great body of the community. Even choir singers, organists, and clerks, have physical labour to endure. The only question is, what object does that physical labour subserve? Surely the Deity cannot be supposed, in any rational system of theology, to be more honoured by indifferent psalm-singing in stifling walls than by those rational pursuits which contribute to the physical and mental well-being of its creatures, or that it would even tolerate the psalm-singing if indulged in to the exclusion of those enjoyments by which, as a homage

paid to its works, the Deity is equally honoured. The greatest worship which the Deity can receive is the ennobling of those forms on which it has stamped the impress of its own likeness, and the fitting them, by familiarity with its works, to attain the important ends they were destined to realize in creation. Those whose services are required to insure the orderly performance of this species of worship find, like the ministrants of churches, their account in it by specific rewards, and indemnify themselves by rest upon other occasions.

The view which is taken of the Divinity by the Sabbatarians is one more worthy of the Hindu mythology or of some low form of Fetishism, than of any religious system befitting civilized men. The notion that the Supreme Power can be honoured by human deprivation has assumed numerous forms, each equally revolting, but never before connected with any high state of civilization. When men thought that the Divinity could be appeased by human victims chosen by lot, or that they might compound for their vices by living on the top of some high pillar exposed to all the winds of heaven, they lived in a very primitive stage of society. But taking one day out of seven, and setting it apart for enshrouding humanity in eremitical gloom and penitential purgation hardly presents a less degrading hallucination. It forms a strange adjunct to the creed of any party living upon the elevated platform which society has reached in this nineteenth

century; but with no party could its retention awake more amazement than with those who utterly scout and ignore the very principle of justification by works, upon which alone such a practice can find any semblance of legitimate foundation.

CHAPTER XX.

RAILWAY AUDIT BILLS.

MR. LOCKE went into Parliament as a supporter of Lord John Russell, but as a supporter of Lord John Russell, yet an untried Premier, when he was but a new-fledged First Lord of the Treasury. It was, in fact, a time when the most golden anticipations were indulged in relative to the noble lord's political career. His youth had been passed in severe studies. He had no heritage of folly, but a ripe harvest of political wisdom to gather in. He had battled in front of the most advanced political thinkers of his day. He had been the formal mover of a bloodless revolution, which had reconducted his party to power, and saved England from being desolated by the political earthquakes which periodically convulse the kingdoms on the mainland. He did not, like Pitt, put his hand on the helm while a raw college lad of twenty-four, but enjoyed the political experience of twenty years, during twelve of which he had been one of the foremost Ministers of the country and the soul of three successive Cabinets.

But there were peculiar features attending Earl Russell's advent to power which conspired to raise men's expectations of his premiership to a more

astonishing height. He found, what rarely happens to any Minister, a surplus of three millions in the treasury. He had not only to encounter a disorganized Opposition, but the chiefs of that Opposition had actually abandoned their army, and transferred their allegiance to his own camp. He was, therefore, in a far more favourable position to carry strong measures than any other Whig Minister since the days of Walpole or Townsend. Is it surprising that even sagacious men augured well of his advent to power ?

The time, too, called for strong measures ; for it was a time of great social emergencies. At home a great commercial crisis swept some of the oldest mercantile houses into dust. Ireland was devastated by a famine, and excited by an incipient rebellion. Every throne in Europe was shaken by political convulsions. Yet if the reader will turn over any chronicle of legislation during the eventful years which began with the Sonderbund war and ended with the inauguration of the French Empire,—years in which a gigantic collision of great principles shook the world, and the most crying social abuses called for remedies at home,—he will find some such account as this :—

“ 16th April.—Brick Duties Bill read a second time. House went into Committee on Cruelty to Animals Prevention Bill ; the dog-cart clause struck out. Protection of Women Bill read a third time, and passed.

“ 17th April.—Smoke Nuisance Bill advanced a stage. Sir George Grey obtained leave to bring in a Bill to amend the Petty Larceny Act.

Game Certificate for Killing Hares Bill read a first time. Chimney Sweepers Act reported ; a new clause proposed.

"21st April.—Irish Fever Bill in Committee. House counted out at six o'clock.

"22nd April.—Nuisances Removal and Prevention Bill read a second time. Dublin Police Bill referred to a Select Committee. Leave given to introduce the Irish Loan Fund Institution Bill. Motion for the publication of the Report of the Select Committee upon Ceylon ; Minister threatened to resign if adopted."

If any bolder attempts at legislation were indulged in, they came to utter grief on their passage. They stand on the parliamentary records like the cenotaph memorials of those beings who died in being ushered into the world.

Yet the legislative machine appeared to be in full play. There was no end of select committees ; the number of commissions infinite ; the number of blue books perfectly overwhelming. But no results. Independent members, resolving to indemnify themselves for the somnolence of the Government, took up great questions, but their bills generally fell through, after a great deal of verbiage, in the second reading. Bills sent down from the Lords managed to get through a first reading in the Commons, but were never afterwards heard of. Indeed, through the Commons nothing could get. There was a dead lock. The support of Ministers was more fatal to a measure than their opposition ; for it roused a spirit of vigilance among their opponents which easily defeated the feeble attempts of the Cabinet to carry any measure they had in hand.

Among the numerous vain efforts of that period to deal with colossal questions, was an attempt to place some check upon the fraudulent dealings of railway companies in palming fictitious accounts upon the world, and making a false dividend enhance the value of shares and serve as a trap to a larger investment of capital. It was also essential to the public faith, that there should be some security that the funds, which Parliament empowered railway companies to raise, should be applied to the objects for which they were borrowed. In both these respects the greatest deceptions had been practised on the public. Dividends, instead of being paid out of traffic, were paid out of capital. The most flourishing accounts were published by companies, whose real accounts, if known, would have left them on the verge of bankruptcy. The illegitimate application of capital was an ordinary occurrence. Some companies spent their loans in buying off opposition. The shares of a competitive line were bought up, in order to get such hold over its affairs as would enable the company to insure the abandonment of the enterprise. The Brighton and South Coast line spent the capital intrusted to them for the completion of the railway in establishing steam communication between Newhaven and Dieppe. The Caledonian Railway Company, instead of laying down their own line, spent their capital, £381,000, in trafficking in the shares of other companies. In one case money raised to construct a line to Harwich had been applied to

construct a line to Norwich. A southern railway company, instead of applying its capital to construct the line for which it was advanced, began a railway a hundred miles off. Such illicit transactions were injurious, not less to the moral character than the commercial interests of the country. Such misapplication of powers, such betrayal of trust, such an utter disregard of law and equity, had inflicted a greater blow on the financial reputation of England than anything since the South Sea bubble. It was as if the reckless gambling-houses of Spa and Baden-Baden had been introduced within the purlieus of the London Exchange. The only difference was, that the stakes for which men played in Leadenhall Street were greater than the stakes for which men played in the German watering-places. In both respects the property of thousands was absorbed by a few clever sharpers. The loss came as suddenly, and the grief of despair was as poignantly expressed. But what made the railway gambling infinitely worse was, that thousands, by the delusive programmes put forth by the railway directors, gave up their little all, under the idea that they were engaging in a perfectly legitimate transaction. They invested their shillings in the mysterious urn held out to them, under the firm belief that by the regular operations of trade they would be turned into so many guineas. Their utter despair in being disembarrassed of their illusion can only be compared to that of the Turkish merchant who, on his way to Bagdad, found all his guineas

turned, in a single night, into so many pieces of slate. First came the prospect of a golden future, of a house in Eaton Square, of the park-like mansion with the forested estate, absorbing every penny, every shred of paper, upon which the deluded victim could lay his hand: immediately after followed the smash, leaving the fancied possessor of thousands like Lear on the wild heath, with no covering but his mantle between himself and heaven.

The stock of the North-Western, in 1845, was 252; in 1847 it sank to 104. That of the Great Western sank during the same period from 246 to 77; the South Western, from 82 to 36; the Midland, from 180 to 60. The average fall in the value of the stock of twelve companies within the compass of little more than a year was 64 per cent. It was felt that Parliament should interfere, not merely to hinder the public from being imposed upon by deceitful programmes and fraudulent representations; not simply to prevent the powers, they granted, from being abused to the injury of the subject whom it is their first duty to protect; but to save the railway companies themselves from utter destruction.

Perhaps no question of similar magnitude ever called for the interference of Government. The railway interest had absorbed the greater part of the floating capital of the country; it had shot up with a rapidity which far surpassed the rise of the funded interests of the country. In 1826 little more than a million was invested in railroads; in 1856 the amount

of capital invested in this species of traffic exceeded 350 millions,—that is, nearly one-half of the national debt. In 1850 the average annual expenditure in railroads was 37 millions; at the same period the average expenses of the Army, Navy, and other branches of Government did not amount to one-half of that sum. In 1853 the total amount received for goods and passengers in about equal proportion was £16,700,000: a sum nearly equal to what the Government raised by direct taxation in the same year. There were 100 millions of passengers, 80,000 officials, and 232 railway companies. Such was the magnitude of the interests requiring to be dealt with. The Government itself had a permanent interest in the stability of the system. They depended on that monopoly for the quick despatch or concentration of troops, and the transmission of letters. The National Bank had invested a large amount in railway property. Its prosperity or decline was indissolubly blended with the monetary interests of the country; yet the Government, with its characteristic insouciance, left this great subject in the hands of private members. Its history in the hands of private members is rather singular to consider.

The first person who took up the subject of railway defalcations was Lord Monteagle, who brought it before the Lords early in 1848. The object of his Bill was to place the accounts of every railway company within reach of the minority of the shareholders, whenever they chose to demand an audit,

independently of the directors. The individuals who called for the audit were to defray the expense of it, unless the great body of the shareholders decreed otherwise; and they were to deposit £200 in the hands of the directors as security for that purpose. Lord Monteagle's Bill was an advance in the right direction, though essentially incomplete. The great desideratum was a permanent audit board, perfectly independent of both directors and shareholders, not acting incidentally according as it was called into request, but overhauling every railway account at the end of each half-year, dividing its operations into distinct compartments, and apprising the public whether the financial transactions of the company were regularly organized; capital and dividend, receipts and expenditure, kept distinct; the money borrowed strictly applied to its legitimate purposes, and the legal expenses properly taxed. But Government supported the measure, which got through the Lords with little or no opposition in March. On the second reading in the ensuing May, notwithstanding the support of Government, it was lost by a majority of 100 against 38. Lord Monteagle, however, impressed with the importance of the subject, did not despair; he resolved to take his time and make sure of his object. Early in the session of 1849, he moved the Lords for the appointment of a select committee to examine into railway auditship. Nearly every person of any authority upon the subject was examined before the members of that committee.

All bore testimony to the necessity of legislation on the subject. Each pronounced the private system of auditship under the management of the council of direction to be the merest moonshine. A mass of additional evidence was produced, showing an utter want of social loyalty on the part of the directors, in dealing either with their own shareholders or with the public. The North Wales Company kept its accounts in cypher; no one, not among the initiated, could get at them. A northern company invariably concealed every report of its accounts calculated to depreciate the value of its shares. The large balance of one company stated to lie in the hands of their bankers was found to consist in the overdue and protested bills of their own secretary. One half of the paid-up capital of another was found to consist of securities equally valuable. The committee of the Lords passed a series of stringent resolutions, which Lord Montague embodied in a new Bill. That Bill passed through the Lords rapidly in July. During the same month it obtained a first reading in the Commons, met with the full sanction of Government, and was in consequence never afterwards heard of.

The attention of the Cabinet was at length thoroughly aroused to the importance of the subject. They resolved to take it in hand. Railway companies at length should feel they had a master. Earl Granville, early in 1850, announced the Railway Audit Bill as the principal feature of the session. To do the Government justice, the measure was framed in a

comprehensive spirit. But it was that sort of comprehensiveness which threatened wholesale ruin to the interest it was intended to regulate. An audit board was to sit in permanence. To that board each company was to send a delegate, and that delegate was to possess an influence corresponding to the amount of paid-up capital represented by his constituents. The Cabinet seems to have gone to Frankfort to model the board of audit upon the principle of the Germanic Confederation. The delegates of those companies whose paid-up shares were under £2,000 should have only one vote. Those whose realized capital fluctuated between £2,000 and £5,000 should have two votes. Those representing capital between £5,000 and £10,000 three votes. The delegates were to appoint two auditors from their number, with an acting chairman invested with dictatorial power over the production of all the archives, deeds, securities, and accounts of each company. The railway finances of the United Kingdom were to be overhauled before this triumvirate every half-year, and their soundness or rottenness exposed to the world. The railway interest took the alarm. A meeting of the leading companies was convened in London. They sent a deputation to entreat Lord Stanley to expose the startling defects of the Government measure, and to become the sponsor of a measure of their own. Indeed, the Government Bill needed no rhetorical artifice to set forth its blemishes. These were sufficiently patent on the surface. The system of centralizing the super-

vision of a capital equal to one-half of the funded interest of the country in the hands of one man would, of itself, have been fatal to the measure. A single irresponsible shareholder would have suddenly found himself in possession of attributes which would have placed in his hands the fate of all the railway companies of the United Kingdom. In a free country the destiny of the leading mercantile interest would have been placed under the despotic control of one man. Earl Granville's Bill had barely got through the second reading when Lord Stanley introduced the railway companies' Bill to the Upper House, which seemed as ready to pass everything as the Lower House seemed disposed to reject everything. The railway companies' Bill differed only in minor provisos from that of Lord Monteagle, which they had virulently opposed in the two succeeding sessions. Each company was to have its own audit committee, of five members, appointed at the option of the shareholders. There was to be no centralization, and no Government interference. The audit committee were to recommend two or more auditors, and the auditors to employ a public accountant. Earl Granville's Bill went to establish an audit outside the company, Lord Stanley's inside the company. Both were referred to a select committee, which was intrusted with the delicate task of constructing a good Bill out of two very bad ones. The Government gave way. They accepted every clause in the Railway Shareholders'

Bill with one exception. Yet, despite this wholesale concession, they could not carry the measure through. It passed the Lords on the 11th of June. On the 13th of June it was read for the first time in the Commons. There was nothing to obstruct its further progress. It gratified the railway interest. It was adopted by Government. Yet no one ever could learn what became of it afterwards. The Bill disappeared,—

“ Like ships which have gone down at sea,
When Heaven was all tranquillity.”

Of the two Bills before the House, that of Lord Stanley, which the Government had adopted, was doubtless the best. But both fell short in providing the great desideratum of an audit, quite independent of both shareholders and directors, and made in the interest of the general public, for whom railways existed. The public had a right to see how the whole transaction was conducted. It was most important that those who lent money to railway companies should know on what securities they parted with it. But as any measure which should apply the same system of independent audit to railways as was already applied to the public service must arouse a virulent opposition, it was, perhaps, more discreet to attempt success in a half-measure than to encounter sure ruin in endeavouring to pass a complete measure. With some such feeling as this Mr. Locke, in the

session of 1851 (April 2nd), reintroduced into the Commons the measure which Lord Stanley, in the preceding session, had introduced to the Lords. Mr. Locke avowed he was the organ of the leading railway companies of the metropolis. He hoped it would be admitted that men who had spent a hundred and twenty millions in great public works were fit to be intrusted with the management of their own affairs. Mr. Labouchere, on the part of the Government, admitted with his usual frankness, that the Bill would do nothing but increase the public delusion, and on that ground he would support it. Under such favourable patronage, the Bill was so fortunate as to get into Committee. But the same cruel destiny lay in wait for Mr. Locke which had tripped up three noble lords in the Upper House. As soon as the railway interest in the Commons discovered that they had, by Mr. Locke's measure, shelved all extraneous interference with their affairs, they set on Mr. Locke himself, and embrued their hands in the blood of the very bantling they had intrusted to his keeping. They first persuaded Lord John Russell not to support the Bill, on the plea that they were preparing one of their own; and when their Bill had served its turn of getting rid of the original measure, they resolved to send it also into the limbo of its predecessors. In vain Mr. Locke protested, and called upon the Government to shelter his charge from the assault of the cruel parricides who had so treacherously deceived them.

Government was too incapable or too indolent to afford him the slightest assistance. On the consideration of the 5th clause Mr. Locke aimed the fatal blow by moving that the chairman do now leave the chair ; and the railway audit fell, never to rise again.

CHAPTER XXI.

ESTIMATES.

THE principle upon which Mr. Locke acted in his criticism of the miscellaneous estimates was, that Government could not carry on its business with any success by adopting habits which would conduct a private company to ruin. Before commencing any undertaking, Government ought to know the price of every article, the limit of every expense, instead of rushing into enterprises blindfolded, and only discovering their mistake when they were obliged to put their hands into every man's pocket in order to consummate a ruinous folly. The chief subjects to which Mr. Locke applied this principle were the Thames Embankment, Westminster Bridge, Dockyard Expenditure, the Ordnance Survey, and Netley Hospital.

Could everything be told as it really takes place, the Admiralty would become the scene of adventures quite as startling as any to be met with in the regions of romance. Ariosto amuses his readers by turning the ships of his hero into sea nymphs; but we hardly know that the transition could be more striking than that of our ships, from what they were to what they are destined to become. Scarcely is one change

effected before the requirements of modern discovery exact another still more sweeping than its predecessor. First, a sailing navy had to be transformed into a steam navy; and screw propellers swiftly followed. Wooden are now giving way to iron vessels, until the vessel itself is about to lapse into a sort of floating tower, with its cabins below water, and to have its Jack tars metamorphosed into artillerymen and engineers. As millions are yearly spent upon this transformation, the jobbery, of course, is immense. At every new phase rush in a fresh army of contractors, who mystify the Admiralty with their estimates, and almost empty the treasury on articles which, as they are not destined to stand gun-shot, are never likely to expose their own deficiencies. Mr. Locke, though knowing little about naval affairs, could not understand why they should not, in their commercial relations, be subject to the same rules which regulate all other business. When Ministers requested money for building or transforming ships, Mr. Locke did not see any peculiar sanctity in that operation to exclude it from the common process which attends railway construction, or building of any other sort. There must be contracts; contracts imply plans, and plans estimates. But Mr. Locke's complaint was that he could neither get specifications, nor any account of the items of expenses which the Government propositions would entail. Beyond the mere vulgar operation of getting the Treasury warrant, the whole affair was enveloped in mystery. Our dockyards might

have belonged to Austria or Spain, for all the nation knew of what was going on in them. Mr. Locke's reclamations, however, were attended with little success. The House, always remiss when the voting of large sums of money is concerned, is never more remiss than when such sums relate to the naval administration. Mr. Locke's expostulations were generally uttered to a thin House, and not unfrequently after midnight. They might, therefore, as well have been addressed to the stone figures in the Lobby for what effect they produced either on the country or the Legislature. The old system of mystery still continues. It is only when some ship with rotten timbers flounders in the Canadian seas, or when the explosion of some engine in the Atlantic sends all on board much farther into space than they bargained for on setting out, that the public is momentarily aroused to the necessity of carrying a lamp into the naval sanctuary, and investigating the efficiency of the service to which more than to any other department is intrusted the safety of the country.

Into the origin of some things it does not do to inquire too deeply, if we would preserve our good humour either with humanity, or with constitutional government. There were on the muddy banks of Southampton Water a few acres, which, whatever may have been their condition in summer, were more like a morass in winter than anything else. No person would plant there, for the very intelligible reason that nothing could grow. The Hampshire

sportsman, in coming to that portion of his ground, always made a careful *détour*. Even the slight-footed hound looked at the place with feelings of dismay; and if the hare went upon it, was freely allowed to have what life remained after such a venture. Yet this ground, which no individual could turn to account, which neither men nor animals would trust, was suddenly found to be likely to prove of immense service to Government, who were at that period looking out for a dry bracing site for the erection of a military hospital. It was suddenly discovered that the site offered all the advantages which Government had long been in quest of, in addition to others which they had not contemplated before. These were so evident that medical opinion was dispensed with. The bog was immediately filled in, the building run up. The British soldier, after escaping the perils of the battle-field, was to encounter worse perils at home. Miasma, on the banks of Southampton Water, was waiting to do that for him which the bullet or the sword had neglected to accomplish. The Government enjoyed the advantage of soon disposing of its man when no more service could be got out of him. The soldier enjoyed the advantage of escaping the miseries of a protracted old age. The Serbonian bog swallowed up an active army. The Hampshire bog, more considerate, only threatened to engulph a useless one.

No notice would have been taken of the matter had the sum first granted by Parliament been sufficient to

meet the expenditure. But Government had been allured into the undertaking by fictitious estimates. The cost was originally set down at £150,000. But Government had no sooner spent £70,000 of the money than it was quietly intimated to them that £100,000 more than the original estimate would be required. At first, they resolved to abandon the enterprise, and to allow the £70,000 to be utterly lost in the mud banks of Southampton Water. At last they took heart and asked Parliament for the additional amount. Mr. Locke demurred: he raised the entire question: he had the satisfaction of being supported by Mr. Sidney Herbert: but neither had the satisfaction of deterring the Government from wasting the public money, in order to plant a sanitary institution in an unhealthy district. Netley Hospital went on even in the teeth of senatorial indignation. It became a fixture in the miscellaneous estimates. Session after session, after the clock had struck midnight, Mr. Locke might be heard denouncing some item in connection with this building, which Government was attempting to smuggle through a somnolent House. The extravagance of sinking some £300,000 in providing a disastrous shelter for 100 men formed a prolific text for expostulation. His censures, though profitless with regard to their immediate object, were doubtless attended with great public results. If Netley Hospital still casts its baleful shadow over the mud banks of Southampton Water, it stands there much as a bad shilling fixed to a tradesman's counter,

or as the wings of a hawk nailed to a barn-door,—a warning against similar attempts, and an intimation of their fate.

Another subject, upon which Mr. Locke's expostulations were profuse, and which fell under his professional knowledge, was the Ordnance Survey. The conduct of the different Governments with respect to it, affords the most eloquent reproof, that we can discover, of the folly of intrusting practical government departments to any but practical men. In this matter of surveying no Government appeared to understand what its predecessor had been doing; or, if it had any acquaintance with those acts, it generally considered them a reason for moving in an opposite direction. Hence, in ordnance surveys, there is an entire absence of that continuity of effort and uniformity of purpose which mark all rational labours. The country, in fragmentary portions, has been mapped out in scales of every variety of dimensions. A survey of England was begun early last century upon the 1-inch scale. When about half-way completed it was pronounced useless. Scotland in 1784 was begun on the 2-inch scale. The survey continued till 1829, when it was stopped by the declaration of an Irish Committee that their country was too important to be surveyed upon any scale less than six inches. The Scotch members thought, as Government practically assented to the justice of this decision, and spent a million of money in carrying it out, that their country was entitled to a fresh survey upon a scale commensurate

with the superiority which Scotland's social rank enjoyed over that of her more prodigal sister. If Ireland was worthy of a 6-inch scale, Scotland, at least, ought to be surveyed upon a 25-inch scale. The Government assented to the proposition, and proposed to include England in the same survey, although the 6-inch scale of Ireland, at much less expense, had answered every conceivable purpose. The work began in 1840, and was carried on till 1852, without any one appearing to know anything about it. But in the miscellaneous estimates of the following year, Government required a quarter of a million to enable it to prosecute the national survey. This item was demurred to. Mr. Locke declared the 25-inch scale useless unless for the purposes of the landed gentry, who, if they required a survey of that magnitude, should be left to prosecute it for themselves. He estimated the difference of the cost between a 1-inch scale and a 6-inch scale as the difference between £250,000 and £850,000. The expense of the 25-inch scale would be considerably greater, and the result, for any purposes Government might have in view, would be useless. The map of Scotland upon the 25-inch scale, no man among them would live to see completed. It would be 250 yards long; it would take up a space equal to the area of Westminster Hall; and a large telescope would be required to inspect it. If England and Scotland had maps of this dimension, the Irish gentry would require one

also, and the waste of public money would be frightful. Why construct charts only fit for the Brobdignagians at a ruinous expense, while for a moderate expense maps could be produced of a really serviceable character? These arguments appeared conclusive. The Premier arose to throw his ægis over the 25-inch scale, but without effect. Parliament gave an adverse vote, and the Ordnance Survey went to sleep, as far as the Legislature was concerned, for six years.

The force of the Government position consisted in this. The expense of a survey on the 25-inch scale differed little from that of a survey on the 6-inch scale. But the map of the larger dimension would be useful to the local gentry and would be bought up by them. The sale of thirty copies would cover the outlay; and these copies could be photographed at a very small charge. The map could likewise be reduced by a very simple process to the 6-inch scale, if it was found desirable to do so. Hence the larger map would, in the end, prove by far the most economical; for if the required number of copies were bought up, the survey would cost nothing at all. Besides, no one ever dreamt of consulting the map on the larger scale as a whole, but only in sections sufficiently small to lie on a dining-room table. The introduction of the telescope was, therefore, a gratuitous piece of romance. But the Government appeared to lose sight of an important element in the case. The 25-inch scale mapped out every minute particular in each

estate, including all the lanes, trees, hedges, drains, and a variety of other features, which change every half-year. Hence what would be a correct survey one year, would be anything but correct the year following. Government would, therefore, be required to keep on foot a permanent board of survey to rectify its maps and render them serviceable to the local gentry. It is very questionable, then, whether Government would have gained anything by appearing in the market as a map-vendor. Doubtless, private surveyors would have been forthcoming to undersell the Government, which would have been placed in a position incompatible with its dignity. The Ordnance Board would have been turned into a retail map-shop and driven into haggling competition with private dealers. The only means of testing the economy of the Government proposition would have been experience. From 1840 to 1853 a great part of Scotland and much of the North of England were surveyed on the 25-inch scale. If Government, by the sale of private maps, could clear its expenses on that survey, why come to Parliament for more money to prosecute it? Why not, before proceeding with the survey upon so large a scale, wait to see whether the sale of the charts of the sections already completed warranted it in going further? The maps of Ireland on the 6-inch scale marked every distinct feature upon each gentleman's estate, even down to the position of a pump or a drain. Yet the million which that survey cost

the country, was not diminished one shilling by the sale of any particular section whatever.

Indeed, if Government felt ever so desirous of turning the Ordnance into a map-shop, there is one fact in the way which would present an insuperable barrier to its success. Everything is undertaken in the most expensive way when the public is the paymaster. When a cheque has to be drawn upon the Treasury, every resource is tried to make the amount as large as possible. Now surveying instead of being an exception, only proves an exemplification of the general rule. It has been seen how the scales grew. The Irish committee got a 6-inch scale; the Scotch committee a 25-inch scale. Again, there are two modes of surveying, one by contouring, or by repeating different measurements of a place at different elevations; the other by taking certain fixed points, such as the crossing of roads or the confluence of streams on the tops of hills, and by triangular measurement getting the relative elevations and distances between them. The latter is the most accurate and least expensive, and for that very reason has been discarded by the Government surveyors; the former is the least accurate, but it has the advantage of being the most costly, and for that very reason has been adopted by the Government surveyors. Mr. Locke, who first called the attention of the House to this subject, estimated the cost of the blundering process of contouring at one-third more than that of triangular survey with the theodolite.

What chance would the Ordnance Board have of disposing of inaccurate charts to the country gentry, while accurate maps were thrust into their hands at one-third of the price?

It is evident that Government, in taking action upon anything, ought only to look to its own needs and uses. Least of all ought it to enter into competition with the private trader; in so doing it enters into a sphere foreign to its purposes, and must work at a disadvantage. Its only chance of success in that case would be to resort to the exploded policy of monopolies, and plunder the subject by making him pay very dearly for a very bad article, when he might obtain a much better article at a much less price. The only object which can interest Government in a survey is to obtain accurate data to adjust the land tax of the country. Now this can be as readily furnished by a survey upon a 1-inch scale, as by a survey upon a 25-inch scale. Government therefore betrayed great weakness in allowing local interests to deflect it into other paths. Yet the blunder was persisted in, despite of the warnings of Mr. Locke and the adverse vote of the Legislature.

In the June of 1860, Government preferred, after midnight as usual, a modest request for £29,000 to defray the expense of the Ordnance Survey upon the 25-inch scale, after the House, six years ago, had decided against it. Mr. Locke resisted the demand. A member proposed to reduce the amount by £10,000, and the House was about to comply with the

suggestion, when the earnest entreaty of the Treasury bench caused the question to be postponed. It still sleeps. And it would be to the credit of Government, were it to allow this question of survey to be hushed up for ever.

CHAPTER XXII.

PUBLIC WORKS.

FROM his intimate acquaintance with France, Mr. Locke had imbibed strong prejudices against the system of centralization, and of employing national money for local purposes. He was against introducing into England any institutions based upon the organized system of bureaucracy exhibited in the art schools of France. He thought more would be lost by the waste of individual energy than would be gained by the formal instruction arising out of the unique organization of public schools. When Mr. Disraeli proposed to group around Kensington Gore all the art schools of the metropolis, and to attach to them a sort of university for the 700 minor schools of the provinces, a vision of the French Polytechnique sprung up before the mind of Mr. Locke, and filled him with horror. He thought all sterling genius would find its grave in schools formulated to a Government pattern, and a square uniform piece of dulness be turned out. Government, he conjectured, would have the power of stamping all art trained out of its schools as heterodox. But as spontaneous effort promotes the growth of genius, it will, when deprived of its natural

advantages and forced into a Government hothouse, wither or grow up a sickly exotic, without the power of startling the world with the grandeur or variety of its creations.

Upon this subject Mr. Locke doubtless partook largely of the perhaps too strong opinions of his countrymen. There can be too little as well as too much centralization, too much as well as too little individual freedom. England and France, in both these respects, are living protests against each other. Each system, however, has its advantages suited to the peculiar genius of the people. The French are naturally sluggish. After the first spurt of courage is exhausted, they easily give up. They require a driver to equalize their movements, to impart impulse when they slacken, to curb them when they run at too dashing a speed. Hence, we question whether the French would be so eminent as they are, were it not for the very excess of their bureaucracy. As a race their inferiority to the Saxon is manifest, yet they contrive to bear upon the political springs of Europe with a weight to which the Saxon can lay no claim. Their system of centralization economizes their collective strength, and brings it to a focus, while it shuts out little individual energy, simply because there is little individual energy to shut out. It is a system essentially the spontaneous product of the French character. It supplies a want, and creates a power, just as individuality is the pro-

duct of the Saxon character, which not the less supplies a want and creates a power. That of France is national strength; that of England social riches, commercial wealth, individual greatness. England has greater political resources within her than France, and is able to endure ten defeats to her one. But, though possessing greater energy, she has not anything like the political power of her neighbour, simply because English energy is scattered through a hundred municipalities, while that of France is always collected in Paris, and darted from the Tuileries with the force of the thunderbolt. Nature is ever fecund in variety. French central and English municipal greatness are two diverse elements of modern civilization. Each is exactly suited to its sphere.

As, therefore, French centralization—though very good in its place—could not be transplanted to this country without ruin to our political greatness, Mr. Locke was perfectly right in sounding the alarm at the appearance of the least approach to the system, and in asserting the opposite principle. We are not so sure that he was quite as right in the application of it to schools of art. There are many things in which Government ought to take the initiative, and in which, if Government did not take the initiative, society could not advance. Without some centralized system of defence, the nation could not be protected from external enemies. Without some centralized system of administration, the nation

could not be protected from internal marauders. Everything, therefore, which concerns the protection of life and property falls under Government agency in every part of the world where there is a Government at all. But this limit is evidently not sufficiently exhaustive. The Post is in the hands of Government, because it concerns the security of the public service. Education is partially under the control of Government, because ignorance is the nurse of pauperism, and because every Government ought, in self-defence, to endeavour to enlighten that public opinion which has the privilege of prescribing its measures. Besides, nowhere are the laws which protect life and property more readily obeyed than among an educated people; and nowhere are the laws which protect life and property more readily violated than among an ignorant people. The support of the helpless is also in the same manner a matter of compromise. The parishes provide the resources, build the workhouses, appoint the masters. The Government lays down the general rules by which such institutions shall be governed, and sends down inspectors to see that those rules are carried into effect. The general principle which governs English practice appears to be this;—for the Government not to interfere in anything which balks individual energy or private enterprise, except in things absolutely essential to its existence as a Government; in all things else to call forth local effort rather than to repress it; and even in matters which fall within its

sphere, to abate somewhat of its dignity, and enter into a compromise with parochial organization, in which the one shall produce all the motive power, and the other only economize that power by a useful direction.

Now, it does not appear that the project which Mr. Locke opposed of affiliating the schools of art in the provinces to those in London, and making the schools in London nurseries for the training of inspectors to supervise the schools in the provinces, represents a new principle, or is at all different from the unique practice of Government upon kindred occasions. The technical schools are placed upon the same footing as the common elementary schools: they originate with the municipalities: the Government simply supplies grants in proportion to the local amounts subscribed. The principle of its supervision is founded upon its perception of the highest kind of art; just as its supervision of the elementary schools is regulated by its perception of the best sort of common educational training. In neither case does it exclude, much less outlaw, all gentlemen reared out of its own domain. It would rather be the first to acknowledge that excellence as the very product of the spontaneous exertion it so much endeavours to excite. The adoption of a central school of art, without destroying an atom of individual exertion, puts before it the best models, and leads it to the highest excellence. When centralization, therefore, enters into a compromise with local energy to foster its

growth, that it may bestow all the advantages of regulated movement without any of the weaknesses of individual repression, it is the product of the highest wisdom. It is calculated, in connexion with art, to give the results of the loftiest genius regulated by the highest judgment. It presents the Promethean fire, not dispersed into meteors and straying over stagnant morasses, but distributed through an organized system which employs its force to the greatest advantage for the progress of man.

The principle of not applying public money for local purposes is sound, unless pushed too far. We think on this ground that Mr. Locke was perfectly justified in refusing to sanction the grant for Finsbury park out of the national treasury. But had that park been at the West, instead of the East end of London, the position could hardly have been defended. All that affects the decoration of the capital of an empire as a capital is a national concern. Even sanitary works upon a colossal scale, which require heavy disbursements, ought to be undertaken at the public charge. London, as a municipality, would be unequal to the execution of the Thames embankment. But that embankment, with the esplanades which are to accompany it, is essential to the health of the metropolis, and will turn into an ornamental appendage what is at present an unsightly series of filthy sewers. The expenditure, therefore, appertains to the nation, simply because it appertains to the nation that its capital be removed from all fear of contagion; that it

be cleared from all foul and unsightly objects; that its leading thoroughfares and public buildings be decorated in a manner suitable to the imposing seat of a mighty empire. It is the centre of fashion, the home of the arts, the main-spring of politics, and the seat of commerce. It is the grand point of attraction to the remotest parts of the empire. The man of business has recourse to it for his affairs, the man of pleasure for his enjoyment. London, therefore, appertains as much to the Cheshire foxhunter or the Lancashire cotton-spinner, as to the banker of Tyburnia or the Belgravian statesman. As their common sojourn no less than as the capital of their common nation, each has a right to contribute his quota to the great public works which the wants of the metropolis call into existence.

But these observations apply to London proper, to that London which is the residence of the ambassador, the home of the colonist, the attraction of the country gentleman. London, however, is a place of almost indefinite extent: it is a city surrounded by a province of houses: there are vast parishes in it which are more local to the visitor than Manchester or Liverpool, and which no one appears to know anything of except the resident. Who ever thinks of Finsbury, save when some election squabble or the historical acumen of its representatives secures its registry on the roll of fame? To judge by the noise made upon these occasions, the foreigner might, by

chance, take Finsbury for the hill of Triumph, the goal or starting-point of the Olympian chariots, whose victory is empire. But even Bayswater omnibuses do not halt there to pick up passengers, as the experienced conductor knows well that the denizens of those regions have little business with the West-end. To grant Finsbury a park at the expense of the nation, would have been quite as absurd as to have thrown the Manchester parks, or that which bears Mr. Locke's name at Barnsley, upon the national treasury. The line must be drawn somewhere. It clearly consists in this:—That all those quarters where the general Londoner resorts for fresh air or amusement, such as Kew Gardens, or Hyde Park, or Kensington Gore, may be regarded as places of national interest. But all those quarters to which no person resorts when he can positively help it, must be regarded as places of local interest, to which the general public have no more relation than they have to the Hebrides. Now Finsbury clearly comes under the latter category. The inhabitants get away from it as fast as possible, as soon as they have an opportunity of disporting themselves in the spacious enclosure of Kensington or Battersea. But who ever heard of the inhabitants of Kensington and Battersea returning the visit? The distinction is patent, and should be observed. On this distinction Mr. Locke insisted.

It cannot fail to have been remarked that Mr. Locke restricted his parliamentary criticisms to sub-

jects on which both himself and the public were aware that his career and experience gave him special license to declaim. What edifices should or should not be undertaken, how they should be constructed, what, and no more than what, they ought to cost—such were the questions on which Mr. Locke conceived that he could enlighten the House of Commons, and on which the House of Commons was always delighted to listen. It was felt acutely that of all the departments of the State, there is none whose efficient control is more vital to the national interests than that of Public Works, yet that there is none where control is less efficient and less satisfactory. The Legislature saw that the difficulties in its administration must be immense. The special qualifications of its chief administrators, it further saw, are always inferior, and in most cases altogether absent. None of them has ever associated his name with any great undertaking. If London be taken as a monument of their collective greatness, their condemnation would be still more severe. Augustus was only one man, but he may be fairly set against the whole range of ædiles who figure in our constitutional history. If all the Government structures of the metropolis were fused down into one edifice, they would not make up one half of the Flavian Amphitheatre. In London there is no communal life beyond that of the clubs, which is totally out of the sphere of Government, and only intended for the refined classes. The citizen beyond the kennel of his home

is houseless. But in Rome the poorest citizen, after bivouacking in his own tenement at night, might pass his day in marble chambers, constructed for his use out of the taxes mainly furnished by his richer neighbours. He might, after spending his morning in the library of Vespasian, or assisting at a sacrifice in the Pantheon, practise gymnastics in the Campus Martius, pass to the baths of Titus, and wind up the day with a spectacle of gladiators in the Colosseum, or a play of Terence in the Suburra. In London, literary mendicants like Savage or Otway, after sleeping on a bulk or by a glass-house, would have nowhere to shelter their head.

The question is not with the dissatisfied members in, nor the dissatisfied public outside, the House, whether Government should connect itself with public institutions so extensive as were those of Rome, but whether in what it does undertake it should not vie with Rome in that efficiency, which cannot exclude beauty, and necessarily includes a judicious economy. As matters stand, we spend the money; but we spend it monstrously badly. The conclusion in all minds must be that the system upon which public works are based is rotten, and that its administrators are incapable. Most of the works are a disgrace: none are complete. The Government edifices are scattered over an area which, in these railway times, is practically the same as if they were situated on the opposite borders of different counties. The condition of our common-law courts is a scandal to a country which prides itself in being

above all others famous for the wisdom and authority of its judicature. The equity courts, which dispose occasionally of millions at a single sitting, are mere waterproof barns. They are surrounded with the filthiest dens, which completely block up the communication between the two main arteries of the capital. Though the surplus funds at the command of Chancery are quite adequate to defray the expense, no plan has been adopted for turning this plague-spot on the western threshold of the City into an ornamental series of squares, which might form a fit receptacle for juridical genius. In our colonies we drive the nomads as far back from our settlements as possible; at home, we cherish them in the very heart of the metropolis.

The buildings in Downing Street were not abandoned until they threatened to tumble about the ears of their occupiers. The National Portrait Gallery occupies one flat of a private house. The Sculpture Hall in Trafalgar Square is hardly fit for a stable. The armoury in the Tower falls far below the armoury-chamber in the third-rate capital of Turin. Let any one survey the figure of England's greatest hero at Hyde-Park Corner, and say whether he does not feel all emotions of ambition die within him at the prospect of being transmitted as a standing jest to posterity. It is not that money is wanted. That is always voted with lavish prodigality. What are wanted are the artistic taste, the scheming brain, the guiding hand. The French are said to be magicians

while presiding over the simmering caldron of the cuisine. Out of the refuse of vegetables they can make the most delicious soups. Their architects will be found not the less accomplished in providing, out of the parings of their expenditure, buildings quite as sumptuous as any upon which we have wasted the expenditure itself. Kensington Gore is by no means an impressive building; in fact, the foreigner generally mistakes it for a temporary shed. Yet Kensington Gore has cost the country nearly half a million. How much has been spent over Trafalgar Square in glorifying our naval pre-eminence it is impossible to discover. Had France England's naval supremacy, she would have had a Neptune more startling than that of Ammanato's at Florence, not rising out of a saucer-basin, but surrounded with an ocean of water, and extending his trident over half the globe, and would have spent little more than the ignoble water-jets which help to travestie the noble hero in whose honour they are displayed.

These sentiments had long been freely expressed by the public, by the press, by Parliament. The waste of the national revenue in works which are not required, or require to be executed in a totally different manner, joined to the delay in inaugurating works imperatively called for, had never lacked denouncers. But within the walls of Parliament there was one man who added to philippics the more useful weapons of studious and intelligent criticism. His life had been spent in the construction

of some of the leading public works in Europe. Companies had intrusted their money into his hands by scores of millions. Withal he had rendered himself famous not so much by the magnitude, vast though it was, as by the economical character of his undertakings. He was an accomplished engineer; but no less was he a hardheaded man of business. He possessed a remarkably methodic intellect, joined to extraordinary powers of concentration. He had an intimate acquaintance with the estimates of contractors, the keenest eye for their excess in conception, the most pitiless hand for their shortcomings in execution. His conscientiousness was proverbial. He was not a finished orator, nor could he be pointed at as an instance of classical attainments. But his address was admirable: he had all the charm which attaches to agreeable manners; and his plain, straightforward, unhesitating speech had never failed to satisfy a popular yet critical assembly. It is not to be wondered at if, when the office of Commissioner of Public Works became vacant by the elevation of Sir Benjamin Hall to the Upper House, that the Lower House should point to him as Lord Llanover's successor. The clubs were confident, public opinion was unanimous. It was not doubted that so faithful a wooer of the general sentiment as Viscount Palmerston would hesitate in following its indication, and in strengthening the civil side of his administration by intrusting to Mr. Locke the superintendence of Public Works. Yet signs of hesitation did show

themselves. The unofficial press spoke out ; but the Gazette was silent. Some remembered that the member for Honiton had voted for Mr. Disraeli's Reform Bill. The cynical muttered something about Burke and the back benches, and wanted to know about Locke's quarterings. The initiated even said that he lacked complaisance, and moreover that he knew too much about public works to be intrusted with them ; but the majority still maintained that he would be the new Commissioner. All doubts were set at rest by the appointment of the Hon. William Cowper.

CHAPTER XXIII.

CLOSING YEARS.

MR. LOCKE'S parliamentary life, therefore, continued a comparatively quiet one. His professional life had now become but little more busy. He sought no engagements and refused many. He was a sort of standing adviser to numerous companies, and was occasionally called in to get others out of trouble. He was well content that the frame of fifty should relax its physical exertions in favour of the frames of twenty-five and thirty. Mr. Errington was still an active worker; many of his own pupils had risen, some were rising into good practice and wide reputation. Robert Stephenson died, Brunel soon followed, and Mr. Locke was avowedly without rival in his profession. It was enough for him to know that the work was being done by able hands. Whenever the profession wished to inaugurate or give fresh impetus to a scheme in which all its members were interested, Mr. Locke was sought for as the presiding genius. His countenance was invariably given with cheerful alacrity. When the Railway Benevolent Institution held its first public dinner at the Freemasons' Hall, in March, 1859, it was felt beforehand that the meeting would be incomplete if he were not

induced to take the chair. At the time, it was admitted how apt and beneficial was his presence. He insisted in his speech, as they might have been sure he would insist, upon the necessity of the institution being self-supporting. In acknowledging the compliments paid to himself, he took the opportunity of uttering a few words upon a subject which he was well aware had been pretty extensively canvassed. "I sometimes find myself," he said, "in the unfortunate position of offending directors who may be in a position still more disagreeable, and of appearing at other times as a dissatisfied proprietor, complaining of want of dividend and extravagant expenditure. In attending a railway meeting, I have never taken a course which I did not think was the best for the interests of those concerned. I may be wrong: I may differ sometimes from my friends; but I think you will take it from me that a conscientious man is bound to protect the interests of those with whom he is associated, and I assure you that I have never hesitated to take that course according to the best of my judgment. I have arrived, it appears, at a right conclusion: for if that were not the fact, I should not be here this evening, supported and assisted by so many friends representing those interests. As an engineer I have met with kind support, and for this fresh manifestation I return you my sincere thanks." The applause which this manly declaration elicited from an assembly consisting of the leading engineers, contractors, and directors of the railway world, proves that, in the

long run, to act solely with the encouragement of one's own approbation is to win the approbation of everybody else.

Of course Barnsley could do nothing without his presence. Was it a station that had to be opened, a school of which the first stone had to be laid, a deplorable colliery accident, to repair whose disasters a public meeting and consequent subscriptions were required, Barnsley sent to know if its distinguished townsman would not come to help them. They must have Joseph Locke. When he went to open their station with due formality, these enthusiastic Yorkshiremen would not entrust him even to the famous horses of their county. The same hands that had dug out the coal which rendered possible his gigantic operations, would drag him up to the market-place. When the Emperor of the French had decorated him with the cross of Officer of the Legion of Honour, he must go down and show it them, and tell them all about Cherbourg. They had some new schools to found, and this was their pretext. But they really wanted to hear about this Cherbourg, which the Queen and the whole House of Commons had gone to see. They had read of it in the newspapers; but what had Joseph Locke to say about it? Nothing but what they already knew. Yet it pleased them to hear him descant on their good qualities, good-naturedly touch upon their bad ones, abuse despotism and centralization, tell them they might thank their stars they were allowed to do pretty much as they liked,

that he did not think any emperor was coming over to interfere with them, but that the best thing they could do was to show by their acts that any such notion, if harboured by the French, had better be abandoned. He knew the north-country population well. He knew them for unimaginative, hard-headed, but withal tender-hearted folks, and discoursed to them accordingly. He talked common sense to common-sense people. Hence it was not very extraordinary that they should want to know if in case Barnsley were enfranchised he would leave that lacemaking little Honiton and come up to his own country and represent coal. Time enough for all that, was his reply. He was bound to tell them he was very comfortable where he was. But if such a thing did occur, why—they would then talk about it. Meanwhile, let them work away right honestly and go on prospering, and they would be enfranchised some fine day. He was never happier than on these occasions. Essentially a frank man, he thoroughly enjoyed this frankness of theirs. It brought out all his geniality. Years of manly battle with the difficulties of life, clearing of mountains, clearing of towns, defiance of rivers, and all the ugly conflict with less noble opponents, had left unimpaired the boyish heart and roguish smile for which on this same Barnsley hill-side he had in his teens been so markedly distinguished.

On the very spot where forty years before he had with his fund of tale-lore “made the night less long”

to wakeful young ears, he was having his joke and showing his pleasant humour, young and fresh as ever, with listeners grown older but not one whit less absorbed than himself. The serious aspect of life, with which of necessity he had been made so intimately acquainted, had not withheld him from ever recognizing and cultivating its humoristic side. Existence must be indeed a sorry occupation to him who either sees not or ignores it. We need despair of no man's ultimate conversion to right views of life who has a fine sense of humour. It is the reconciliation between life's practical paradoxes: it is the rainbow of the psychological heaven, which announces that the waters of bitterness have departed: it preserves youth or restores it: it keeps the heart sound: it keeps the head clear: it had done all these for Joseph Locke. And so the brawny-armed vulcans of the mine shouldered up to hear not a great man from London, who would talk finely to them, but a cheery companion who knew all they knew, and a great deal more, and was not too proud to tell it them in language they could all understand, garnished with sly banter they could repeat and chuckle over at their own firesides. And though they have laughed with or roughly applauded him for the last time, his name is with them a household word still. In their grammar-school, "Locke scholarships" can be competed for by "all boys of good character between the ages of ten and fourteen, without regard to religious tenets, who are the sons of parents born or residing within the town-

ships of Barnsley, Dodsworth, and Keresforth-Hill," a college cap being the badge of their honourable preferment. The foundation has been established by Mr. Locke's widow. Similarly bestowed is the "Locke Park," which overlooks the town—a spacious enclosure, as much removed from smoke and noise as any plot can be in that toil-held district. Its denizens do not regard what hurts southern eyes and nostrils with a like disfavour. "Where there's reek, there's brass," was the answer we once got from a pitman to whom we hinted our sentiments on this subject. The "reek" is not disagreeable to them. But for all that, they like the green field, laurelled walk, and courteous avenue; and all these they have close to, and can call their own in the Locke Park. Those to whom life's hard work is yet unknown, prepare by pastime their young limbs for the more serious toils of coming years; whilst the bent backs whose once free inclinations have helped to speed the good Barnsley coal to Pope, Kaiser, or colonist, find repose on benches, whence they can survey the sports of those whose youth more fortunate than theirs has fallen in such pleasant places. Not far away, in front of the Roman Catholic schools, of which Mr. Locke was a leading benefactor, is a handsome and tasteful memorial, erected, as its inscription records, as a tribute of respect and gratitude. To all religious denominations was his tolerant liberality extended. Talk is rife of erecting a statue in the town itself. Barnsley would do itself but justice by its erection.

But the most important year in Mr. Locke's closing life was that in which he figured as President of the Institution of Civil Engineers. His address on taking the chair for the first time after his election has been already alluded to, and slightly quoted from, in our estimate of English and French railways. It was our good fortune to hear the address delivered. We had seen him the very afternoon confined to his bed from a severe attack of influenza. Yet the evening, at eight o'clock, he was in his place in the chair, even refusing the kind offers of the Secretary to read his address for him. But Mr. Locke was too "thorough" to be able to sit quietly by, whilst another gave utterance to his thoughts. Besides, he doubtless knew the full value of his voice—perhaps his greatest social charm. The address was long, but listened to throughout with unflagging attention. The leading journals showed their appreciation by reporting it verbatim in their columns, and calling attention to its facts and its arguments. The last page we must needs quote here, as it tersely expresses Mr. Locke's views on the duties of his profession. Had he dwelt longer on the subject, he would have seemed to be speaking his own eulogium. Yet to those listeners who knew the man and the motives which had so markedly governed his professional conduct, these sentences, short and general though they be, failed not to carry somewhat of a personal, no less than a public significance. And we reproduce them with all the more alacrity, because

even yet they do not seem to have met with that full and cheerful acceptance in quarters where it is absolutely necessary that their truth should be unquestioned.

“Let me,” he said, in conclusion, “say a few words on a topic that more directly concerns us. It may perhaps be objected that my sketch, as designed for a professional audience, brings into undue relief the financial elements of the subject. To this I would reply—recalling its expressed purpose, of offering materials for a comparison of the French railway system with ours—that it is here, precisely, that their essential distinction will be found; that whatever is peculiar to the former—from the commencement of its proceedings to the development of its finished works—practically resolves itself into a control of the application of capital to a given end, and, beyond this, into questions of the amount and productive effect of the outlay thus controlled. But, further, it may be observed, independently of particular objects, that this side of the railway question, so far from being foreign to the Civil Engineer’s province, must, on the contrary, under existing conditions, be always deemed an important part of it; so important, indeed, that it cannot now be excluded from even the most limited view of his professional studies.

“Let us consider the principle on which public works are now undertaken:—the motives that supply those abundant means by which, alone, they become

possible. It must be seen, that the problem proposed, on such grounds, to practical science, is, not merely the execution of certain works, but rather their arrangement and construction in a manner calculated to realize the objects in which they originate. If the 'adjustment of means to ends' be truly described as the right aim of the engineer, that aim, it is evident, would be but half reached, were the end, contemplated by the promoters of a given enterprise, overlooked in devising the means of carrying it into effect. The proposition here is;—not simply that railways should be made, but be so made as to produce to their proprietors the benefit, in expectation of which the funds for their construction were contributed. The profitable effect of capital, directed to a given object in the hope of profit, is thus a main element of the subject on which the modern engineer has to exert his skill and judgment. It may, indeed, be termed, taking a general view of this matter, as much a part of the whole, to be dealt with by practical science, as the method of construction, or the choice of materials. Beyond this, observing the springs from which our profession draws its support, and the relation which it bears to the voluntary employment of private means in public works; the significance of financial results, as final exponents of their success, or failure, must be apparent.

“The practical science of our day, as enlisted in the service of monied enterprise, must indeed confess

itself at fault, if, by any defect of its own, that enterprise were defrauded of its fair reward. Thus it is concerned, not only in guarding against this default, but also in the discovery and indication of whatever influences (beyond its sphere of action, but of which it may unjustly bear the reproach), tend to frustrate the hopes of attainable benefit; and thereby to dry up the source, or to divert to other channels the current of future enterprise. For it is obvious that, when the employment of science by wealth is mainly actuated by the stimulus of gain, the spur being withdrawn, the occupation must cease. Public works will no longer be attempted, where experience proves that their result, instead of profit, is ruin. Confidence gives place to distrust; capital seeks its harvest elsewhere; and the cause of past disappointment and loss becomes the object of a prejudice which years may not eradicate.

“In every point of view, therefore — whether especially considering that it is the triumph of science to solve the whole of every problem submitted to it, and not a part only, or regarding its general relations to the objects of modern society in inviting its exercise—it will be seen, that the financial result of their joint operation is not their least important feature; and that the appreciation of this side of the question really concerns the engineer, no less than the statesman or the capitalist.”

There is not a sentence in the above but what

every man of practical science ought to hold as his professional gospel. Any deviation from it is rank heresy, a misleading of the public, and in the long run a deep injury to practical science itself. Though science should ever be ahead of the world in its speculations, it should ever be content to follow the world in its wants. Viewed in its first capacity, it affords fitting occupation for the philosopher or man of thought. Viewed in its second, it subserves the end of the man of action. We are far from implying that the two may not be united in the same person. Still, even when so united, its purposes are not the less distinct. In the closet, the imaginative mind may harmlessly, nay beneficially, employ its splendid restlessness in maturing schemes for the looming necessities of a gigantic Future. But the moment that its possessor emerges into the street, he must circumscribe his performances to the wants of the undergrown Present. Who that has traversed Mr. Locke's great works can doubt that it would have been an easy matter for him to have designed vessels that no dock will hold, no company charter, and no sensible man invest ten shillings in? It would have been the easiest matter for him to execute canals destined to be shortly given over to the dominion of the frog and the water-rat. Nor can we suppose that he would have experienced any great difficulty in building bridges in outlying dependencies for which the country they adorned could find

no traffic, and whose bankrupt condition would sow between mother-country and colony the seeds of a deplorable animosity and alienation. Shareholders do not want works of art: they want half-yearly dividends. What avail the dimensions of an arch when the receipts are rapidly ceasing to have any dimensions at all? It is but sorry consolation to a man whose shares are ever so much below par, to be told that his viaducts are ever so much above the level of the sea. There is very good ground for fearing that he will soon wish they were, and ever had been, ever so much beneath it. We laugh at folks buying a purse with their last shilling, just as the Spaniards have a joke about bridges over rivers run dry. But we have had the thing done in our day, not by melancholy knights-errant, but by men of science, with a dozen decorations, and twenty initials at the end of their names. What do these pets of learned societies desire? A Pyramid containing half-a-dozen dead kings is quite as satisfactory a work of art as a tunnel containing half-a-dozen live tourists.

Such were Mr. Locke's earnest views; and we therefore express them as forcibly as we can. If it be true that it is more important to a statesman to know what not to say, even than what to say, it is still truer of the practical engineer that it is more important for him to know what not to do, even than what to do. The doing what does not pay, manifests

either his want of judgment or of conscientiousness. Abstention from so doing is no proof that he could not do it were he so perversely minded. There can be no possible case where, having a giant's strength, it is so tyrannous to use it like a giant as where its exercise sweeps away the earnings of the thrifty. We assert, without the slightest fear of challenge, that Mr. Locke never once, in the course of his professional career, impoverished a single individual by building works for the purpose of magnifying his own reputation. If others proposed a tunnel that would be the talk of the present and the marvel of succeeding generations, he insisted on an undemonstrative embankment. Graceful curves, conquests from the sea, pretentious bridges, were quietly thrust aside by him, and a very steep hill going straight to the object was preferred in their stead. He had no remark to make except that such would be cheaper, no other argument but that shareholders would so get more for their money. His lines in England and Scotland are more numerous than any other man's. They confronted and traverse their most difficult provinces. Yet no other man's perhaps can show so few wonder-raising works. If you want his monument, you must look for it in the share list. There you will find it. And the thoughtful will not forget that such discovery is the silent epitaph of him whose self-abnegation in the pursuit of "aves vehement" is still giving pleasant bread to thousands

upon thousands of our nation, and steadily urging the amelioration of our race: an amelioration which is sure, so long as it is based on the positive foundation of material improvement. It is the fate of most men to be only benevolent. It was the good fortune of Joseph Locke to be not only benevolent but beneficent too.

CHAPTER XXIV.

LAST DAYS.

MR. LOCKE'S whole existence had been one essentially of bodily no less than mental exertion. Physical inactivity would have been to him, no less than intellectual torpor, a mere death-in-life. We have seen how, when the dignity consequent upon attained superiority required that he should retire from the more turbulently active pursuit of his profession, he found a vent for the energies of his practical mind in criticising the estimates of Government, or making a sudden sally upon the placid optimism of easy-going directors. So we cannot wonder if we find, when his professional occupations no longer led him on to the roofs of houses, or to the summit of mountains, or into the depths of tunnels, that he sought compensation for the loss of engineering surveys in the exercise of manly sports. He no longer walked from Warrington to Birmingham in three days, but he strode across the heather on the slopes of Queensbury with as determined and untiring, if not so elastic, a step as when he had stormed Shap Fell, level in hand, or tracked out afoot the straight, steep lines of the Caledonian. If he did not tire out assistants and contractors, he tired out dogs and keepers.

He had made several attempts to purchase an

estate in Scotland ; but he had somehow never met with one for sale that satisfied him. On his estate at Honiton there was no residence. This made him all the more desirous to have one north of the Tweed on which there was one. Still, though insisting upon this point, he wanted it more for the sake of adjoining moorland than as a country seat. He loved his shooting, and cared to surround himself and guests with the comforts of home whilst the shooting season lasted. But it is quite certain that he would have made use of it for no other purpose. With a fond eye for the beauties of natural scenery, and often regretting the disappearance of rural suburbs, and even playfully rebuking himself and his professional brethren as unholy devastators of the soil, he was not one to whom a quiet country life would have been welcome for any length of time. Habit is not, as has been said thousands of times, second nature, for the simple reason that it is the first and the only one. Mr. Locke's habits had made the social to him the natural state. The qualities which he possessed pre-eminently had been cultivated among men and in cities. Among men and in cities he was still at home. Elsewhere he was but a traveller. He had been one of the leading, if not the leading, industrial worker of his time. It was too late for him to be satisfied entirely with sunsets and speculations. He had never acted without previous thought. But then he had rarely thought without carrying his thought into action. Thought which

ended in thought, or only in an octavo volume, did not satisfy him. He wished to see it in operation. His wonderful success had arisen from the application of means to ends. Ends for which the means were not forthcoming had for him at any time but an evanescent interest, and sometimes no interest at all. How best to do something that wanted doing at once was the problem he most cared to solve. He enjoyed the peculiar character of a conflict with what we call inorganic matter. That passive submission to storm and sunshine which, even under the most favourable application of agricultural and chemical science, must be conceded by the cultivator of the soil, that waiting upon the seasons, that taking of time and silent growth into partnership with manual labour, would have irritated his active and monarchical mind. In the execution of the great undertakings of his manhood, it had been one continuous battle against time and growth, in which he could not afford to let them have a moment's truce. Truce meant victory to them, to him disaster. A holiday meant the collection of water and the caving in of a tunnel side. Waiting upon Providence terminated in breach of engagement. He had been accustomed always to see his enemy and always to have one. He could never have sate quietly down and watched the barometer. He had been accustomed to obstacles enough; but they were obstacles he could compel, or at any rate encounter. Country pursuits would have provided him with no such

welcome foes. Guerilla warfare with fitful elements would ill have followed on his long experience of regular conflict and stand-up fight with obstinate rivers and unretreating mountains.

So it was perhaps as well that he found no place in Scotland that quite suited him, and that he had to remain content with so many thousand acres of the Beattock hills to shoot over. The Caledonian line runs right along their base, starting therefrom on its stiffest ascent. Likely enough he chose this ground for his gun all the more because in his very prime he had there fought a great fight and won it with his theodolite. The steep gradients proposed up those hills had been denounced in no measured terms and by no mean authorities. There they were, however; and up them went the night mail north, with an additional engine attached at the Beattock station, at a pace fast enough to satisfy either lover or lunatic, and from them came such dividends as need not keep the first single, and certainly had not sent the second insane. He crossed the line every morning on his way from Moffat to the moors, and every evening from the moors back to Moffat. And if he took, as we believe he took, a pleasurable pride in having it under his gaze as he drove home at sun-down, the rough carriage stocked with game, the pride was both honest and human, and the pleasure but the just guerdon of his indomitable will.

His character was as distinctly displayed on the

moors as ever it had been in cuttings and half-yearly meetings. He was so completely without self-consciousness, he was ever so thoroughly in earnest, so frank and careless of concealment, that in the most trivial as in the most serious occupation, you saw but one man. It was impossible for him ever to be desultory. He manifested his powers of concentration quite as much in his amusements as in his labours. Not to be methodic was in his eyes to be nothing at all. Either a man went at a thing systematically, or he did not know in the least where he was going. He was on the moors for the pursuit of game. There was one best way of pursuing them, and that was the way for him; but it must also be the way of everybody else. He took the opinion of the keepers, sometimes to adopt and sometimes to reject; and he then mapped out a portion of the moor, sending one gun here, another there, as though he were sending them on a serious campaign. He had been accustomed all his life to give orders; and he gave these pleasant ones with an air of authority that we felt became him, even while it afforded affectionate mirth for our humour. He always took the most difficult and least likely ground for himself. After the accident to his leg in France, of which we spoke in the chapter on the Cherbourg line, he was obliged always to have a pony on the ground in attendance; but such was his thorough-going energy that he came at last to make very little use of it. His surveying experience gave him immense advantages,

which he turned here no less than on business ground to admirable profit. He was the skilfulest of stalkers; he was, moreover, the most patient and the most persistent; however punctual he might be in beginning, he was never to be depended on at the close of the day's sport. A sly old black-cock, or a wild young covey, once marked down, was sure to be followed up, no matter what watch-hand hinted or hunger implored. All the way home, and again over the fat Scotch fare, from the first spoonful of haggis to the last spoonful of toddy, would he talk over the tricks "those rascals," as he called them, the birds, had played him, or he had played them in turn; how he had been balked by them for a couple of hours, but had turned their flank when they were little expecting him; how he had crept up this knoll, forded that burnie, or startled that brackenside,—was with him food for hours of the cheeriest talk. Sometimes a wary old black-cock, with a white tail typical of his years, experience, and many narrow escapes, had given him, after long creeping with bent back under loose wall or crawling half a mile through friendly heather, the final slip; but he would have the old rascal to-morrow, and so was consoled. He regarded them as difficulties to be overcome, opposition to be baffled, wily foes to be outwitted; viewed in any other light, they would have afforded him no zest. The mere desultory following a dog was to him idleness; the systematic pursuit of game was industrious occupation. His moors were but moderately stocked; a

greater abundance would have robbed him of his sport. He liked to work for his bag. With him the reward was, indeed, in the race he ran, not in the prize. If his manly energies were evoked, he was happy. Conquest was necessary; but then it must not be an easy conquest. It is one of Rousseau's shrewdest remarks in "Emile," that the discovery of a method how to learn with difficulty would be a most advantageous discovery in the education of children. The remark may be extended. To win with difficulty is the only condition which makes it worth a real man's while to strive. *Tandem venit victoria læta*. There is no joy in the victory that comes too soon.

On the 12th of August, 1860, according to his wont, he went down to Moffat, where he was joined as usual by friends whose enjoyment of the moorland sport went far to double his own. Never had he shown himself in higher spirits or in better health, though the one had always been so equable, and the other so elastic. He was full of fresh anecdotes; old ones had assumed a novel colouring. He was readier than ever, of an evening, to sing his favourite songs with his usual disregard of rhythm, and even more than his usual fervour of expression and sweetness of voice. He flung his banter about with a playful prodigality wonderful to those who had been bantered by him for years. Louder had grown his praises of Scotch moors and Scotch fare. There was nothing like

them. They set a man up for the rest of the year. They made him go through the drudgery of committee-rooms, surmount the perils of Richmond dinners, face the late hours of party divisions, even survive the insidious pestilence of the inodorous Thames. He thought he had never shot so well. He was quite certain he had never enjoyed his shooting so much. The weather was very broken; but what mattered a wet skin? The whisky-flask put that all to rights. However, towards the close of the month, the rain and the wind had so determinedly set in among those lowland hills that the birds got unmanageably wild. The guests who were with him were leaving. He would have nobody else down for a week or ten days. The weather might take up; the birds should be undisturbed; he also would meanwhile go away. The last few years his wife had been forbidden by her medical men to risk the fatigues of so long a journey. She was staying at Oatlands Park. He would go and stay with her. The night before the party broke up, the conversation, after dwelling on the unsatisfactory exploits of the day, the bag having been a very poor one, ran into a very different subject,—the subject of the present political state in France. Some were urging the necessity, whatever might be the apparent evils, of maintaining yet awhile the despotic form of government, and the satisfaction which on the whole it seemed to give to the majority of the nation. The first position he combated with his customary ardour.

He granted the second assertion, but could see in the fact which it implied nothing but what must move a brave man's contempt. He began quoting Byron's lines :—

“ Oh ! shame to thee, land of the Gaul,
Oh ! shame to thy children and thee !”

and after accurately repeating the first two stanzas, failed in exact verbal remembrance of the third. “ Wait, I have it :” he said, laid down his cigar, rose from the sofa where he was reclining, and went across the room to his travelling bag. “ Why, Locke !” one of the party exclaimed, “ do you carry poetry about with you ?” “ Carry poetry with me !” was the reply, “ I never travel anywhere without a copy of Byron; but this time I have more than usual ; you'll find Cayley's Dante on that table, if you look. Ha ! here it is.” He went back to the sofa and read with the full expression of scorn, from first to last, the withering lines which he had begun to quote. When he came to the close, he flung the book on the table. “ Splendid !” was the remark. “ Splendid !” he answered, “ they're magnificent, and not more magnificent than true ; and they are truer now than when Byron wrote them.” The next morning the guests departed. He sent his clear tenor voice with a piece of badinage and a merry laugh after the retreating wheels. We had heard that laugh for the last time.

He spent some quiet happy days on the banks of the Thames, at Weybridge, with his wife. Loth ever

to lose his presence, but well aware what good his exercise in Scotland did him, she at last told him to return. The weather had become more settled; the birds were not so shy; and he had another week's thorough sport. On Sunday, the 16th of September, he was in excellent health and tone. In the evening he was exceedingly talkative, his conversation being exclusively retrospective. On Monday morning he did not appear at breakfast, and sent word that he should not go out shooting that day. His nephew, Mr. William Locke, whose name has already been mentioned in connection with the Barcelona and Mataro, and the Caen and Cherbourg lines, went up to his room and asked if he could answer any of his letters for him. "No, no," was the answer; "you go to the moors, bring home a good bag, and you will find me downstairs and all right when you come home to dinner." At dinner-time, however, he was still in bed, was suffering from considerable pain in the bowels, and had seen the local physicians. Mr. William Locke telegraphed to Edinburgh for further medical assistance, and at the same time to London to Mr. Locke's regular medical adviser. Their services would have been of no use could they have arrived that night. It wore away in pain, all attempts to alleviate his suffering or to remove its cause being unavailing. He thought the hours moved very slowly. When would it be eight? With eight was connected his idea of morning; for at eight he rose. Was it not eight yet? Eight came at last, and with its arrival, giving no admonition of the

sudden catastrophe, he expired. The previous month he had completed his fifty-fifth year.

The kind people of Moffat, told that they would see no more the pleasant form they knew so well, testified their grief in simple fashion, closed their shops, congregated in knots, and looked very grave. The weather-blown keepers, with the steady old grey pony, and the whining black-and-tan pointers, stood up at the gate on the bleak moorland, waiting and wondering deep into the day for him who came not. They were quite forgotten. But the telegraph flashed the sad news to Honiton of the loss of their member, to his invalid wife of her life's companion, to hundreds of a genial friend, to the nation of its chief engineer, to the world of an ornament and a right-doer. To quiet English sea-side, to gay German Spa, to the clubs and changes of northern towns, to the squares and balconies of southern cities, went the melancholy tidings, stalking sombrely in upon the autumn pleasures of hundreds who had known and loved Joseph Locke, and who had thought his life the best life among them all. Many were made to moralize; the strong man had been struck down; the most needed had been taken away; the least likely to go had gone; the triumph of the most successful was determined. Long ago it had been written that

Sceptre and Crown
Must topple down,
And in the dust be equal laid
With the poor crooked scythe and spade.

Times had marvellously changed; and the "poor spade" had come to wield a dominion broader than that of the sceptre. But for all that, the truth held good; and he who had wielded it best and for noblest purposes was equally with kings without "armour against fate."

Yet if it be, as we thoughtfully believe it is, no unholy arrogance to associate triumph with the inanimate, one triumph more was destined to Joseph Locke. The body of the dead engineer was whirled with the speed of an obedient hurricane over upwards of two hundred miles of road he himself had made. The artificial trappings of all known triumphal ways pale before the terrible simplicity of this swift, undecorated journey. It began among mountains he had circumscribed; it ended in cities he had enlarged. Slowly but surely from the base of hills, along which he had run his resolute lines, civilization had ascended almost to their summit. Fine-flocked sheep, whose value was as great but not so fabulous as the fleece that tempted Jason, were washed in the stream where, a few years back, only the salmon leaped, or the otter ran to shelter. The tinkle of the bell-wether resounded where but lately the bittern cried. The wants of mankind had invaded nature's securest keep, at first with an uncertain stride, but now with a foothold never to be loosed. And the yellow barley waved its insignia of conquest where the grouse had sunned themselves in the heather, and the black-cock sheltered in the fern. He had been their first invader: his

skill and energy had made them submissive to the demand of man. He was passing from them for ever. To him many a town now traversed by his corpse owed the length of its streets, many a field the breadth of its wheat, every rood of ground, every yard of brick an improvement in value represented in the ease of human hands and the content of human hearts. Could the population past whose homes his body was being so swiftly borne but have been made for that day thoroughly conscious how much they owed to his civilizing labours, thousands would have lined the extended route, and myriads of hands been raised to bless him. But not because the occupied world troubles itself much less about its benefactors than its despoilers, should this strange last travel be unrecorded here. Till he came close upon Birmingham, he had journeyed over what may be fitly termed his own domain. There was not a foot of ground from Beattock whose construction he had not superintended. And now from Birmingham on to London, the line that had not been made by his labour, had at least, when its original makers passed away, sought for his counsel and been grateful for his guidance. His professional friends talked of Westminster Abbey. His widow silenced all such suggestions. He should be quietly laid where she might one day join him. She was quite sure that such would be his wish. In death no less than in life should hold good the motto, *Ubi uxor ibi domus*. He must be buried in Kensal Green, next to the vault where lay the honest

author of "The Press." Withal, and despite the empty state of London in September, a long line of carriages testified the grief of the present, the respect of the absent. A monument, handsome yet simple, has just been erected over his grave. It is the gift of his pupils; the eloquent testimony of their grateful veneration.

A large number of noblemen and gentlemen, met in the public room of the Institution, resolved that a marble statue should be erected to his memory, subscribed the money, nominated a committee, and chose Baron Marochetti as the artist. He is at present engaged on the work. Place was asked for it in the gardens of St. Margaret's, Westminster. Opinion spoke aloud that space should be granted. The Government shuffled till the urgency of the demand became fainter from disgust. Mr. Cowper then took courage to refuse. The refusal was consistent and perhaps discreet. The greater the honour paid to the memory, the more would be remembered the disregard paid to the merits of the engineer. The statue will, therefore, probably adorn the Locke Park at Barnsley. In Westminster Abbey, however, a memorial window will shortly be erected. Such tributes, gratifying though they be, do more honour to those who erect than to him to whom they are erected. His monuments are scattered through the land.

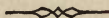
In private life, and in the management of his own

personal affairs, he acted in precisely the same manner as in public, and in the control of national undertakings. He gave away hundreds yearly in charity. He never gave away a shilling without inquiry. If appealed to by a benevolent institution, he inquired if it published every year a properly audited account. If it did, there was a cheque; if it did not, there was an end of the matter. He would give three, five, even ten thousand pounds, with good reason shown, and then sit down to write and inquire who it was that forwarded him his letters in a fresh envelope, and so, by increasing their weight, made necessary the use of another postage-stamp. He would examine every single item of his hotel bill to the last centime; and having perhaps knocked off a couple of francs, would give a couple of Napoleons to the domestics. Once, when he was coming over from France, the custom-house officers on this side wanted to make him pay on a pair of boots which he maintained ought to pass unchallenged. They were obstinate; so was he. He would not pay the money; they retained the boots. On arriving in London, he wrote to the local chief. The chief answered that he, too, considered the boots chargeable. Mr. Locke memorialized the Board of Customs. The Board decided in his favour, and he got his boots. He had given himself an infinity of trouble; but he had gained a point which he thought it his duty not to concede. It is well for hundreds of thousands of railway shareholders that

he ever acted on their behalf, when millions were at stake, on precisely the same principle which governed his behaviour in this trifling dispute.

A biography should not close with a disquisition, any more than a fable with a moral. Both necessarily carry their own explanation.

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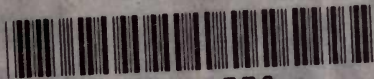
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